In Two Sections—Section One

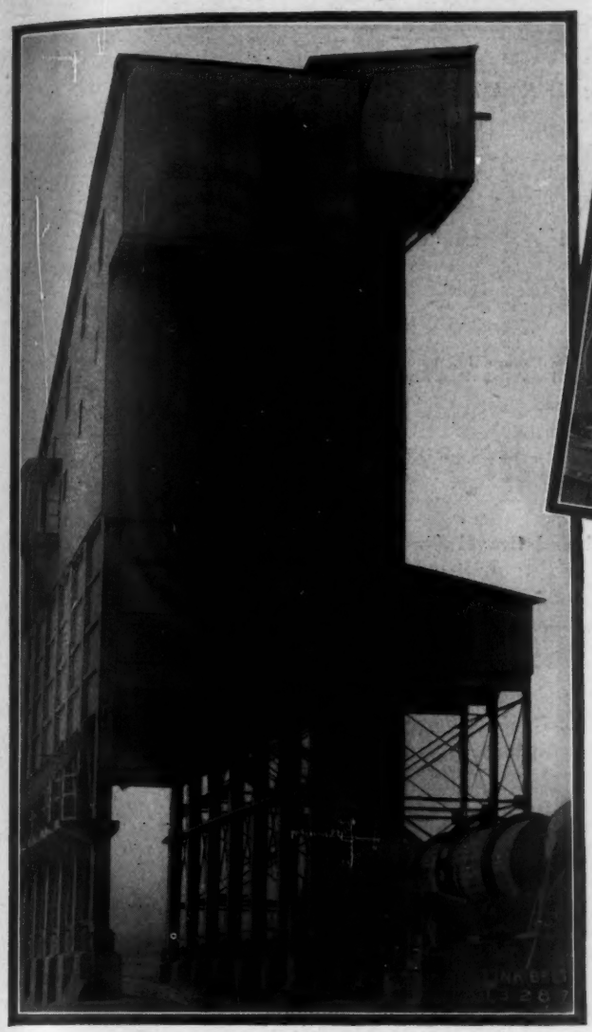
Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, January 7, 1928 (Issued Every Other Week) Volume XXXI, No. 1

MEMBER A. B. C. *The Only Paid Circulation covering the Rock Products Industry* MEMBER A. B. P.

Printing of This Issue Is 5500 Copies. Next Issue Will Be January 21



Washing and Sizing Crushed Stone

THIS plant of the Marble Cliff Quarries Co., Columbus, Ohio, is the second which they have equipped with Link-Belt Inclined Conical Screens.

Other Link-Belt Products

- Elevators and Conveyors
- Stone and Lime Handling Equipment
- Locomotive Cranes
- Crawler Cranes
- Portable Loaders
- Dragline Excavators
- Screens
- Crushers
- Sand Separators
- Chains, Wheels, Buckets
- Gears, Transmission Machinery

See us at the Good Roads Show, Cleveland, January 9-13, 1928

One of the reasons why Link-Belt sand, gravel and crushed stone handling equipment is so effective and efficient is that the principle of operation of the Inclined Conical screens is reverse to that used by ordinary screening processes.

Both material and water are fed into the first (uppermost) screen and pass directly through the large holes into a waterpan underneath, with the exception of the largest size of stone, which is screened out and discharged through the small end of the cone into the first bin. The waterpan delivers into the next screen, where the process is repeated for the next operation—and so on through the entire series of screens and separations. In this instance the sizes range from 1½ in. down to "sand."

The material is fed into the large end of the screen—which has the most wearing surface. This provides the largest screening area where most of the material is screened, and heaviest plates where the coarsest material is handled.

Each series of screens is mounted on a single long shaft, supported by bearings between each screen. The drive is simple—a pair of bevel or angle gears.

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Rock Products

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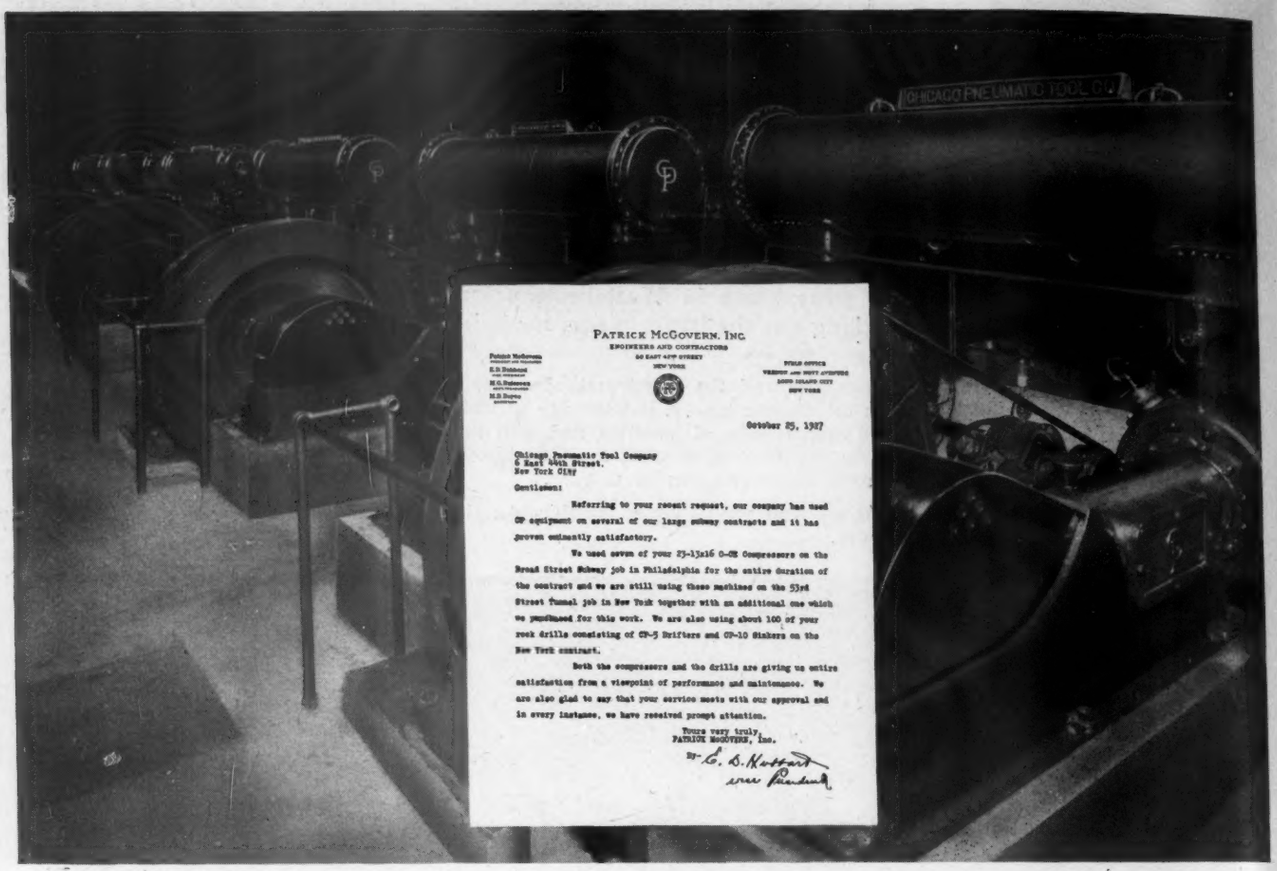

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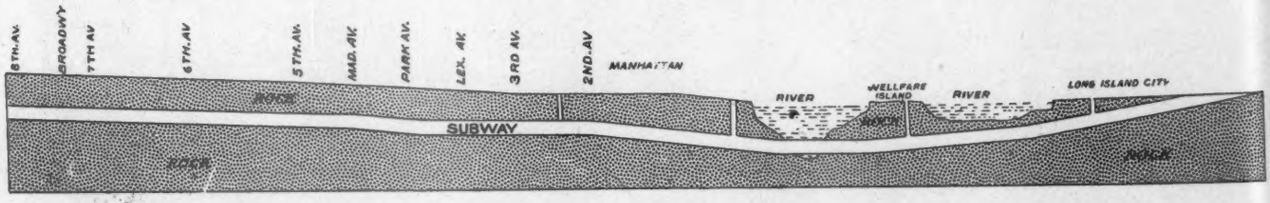

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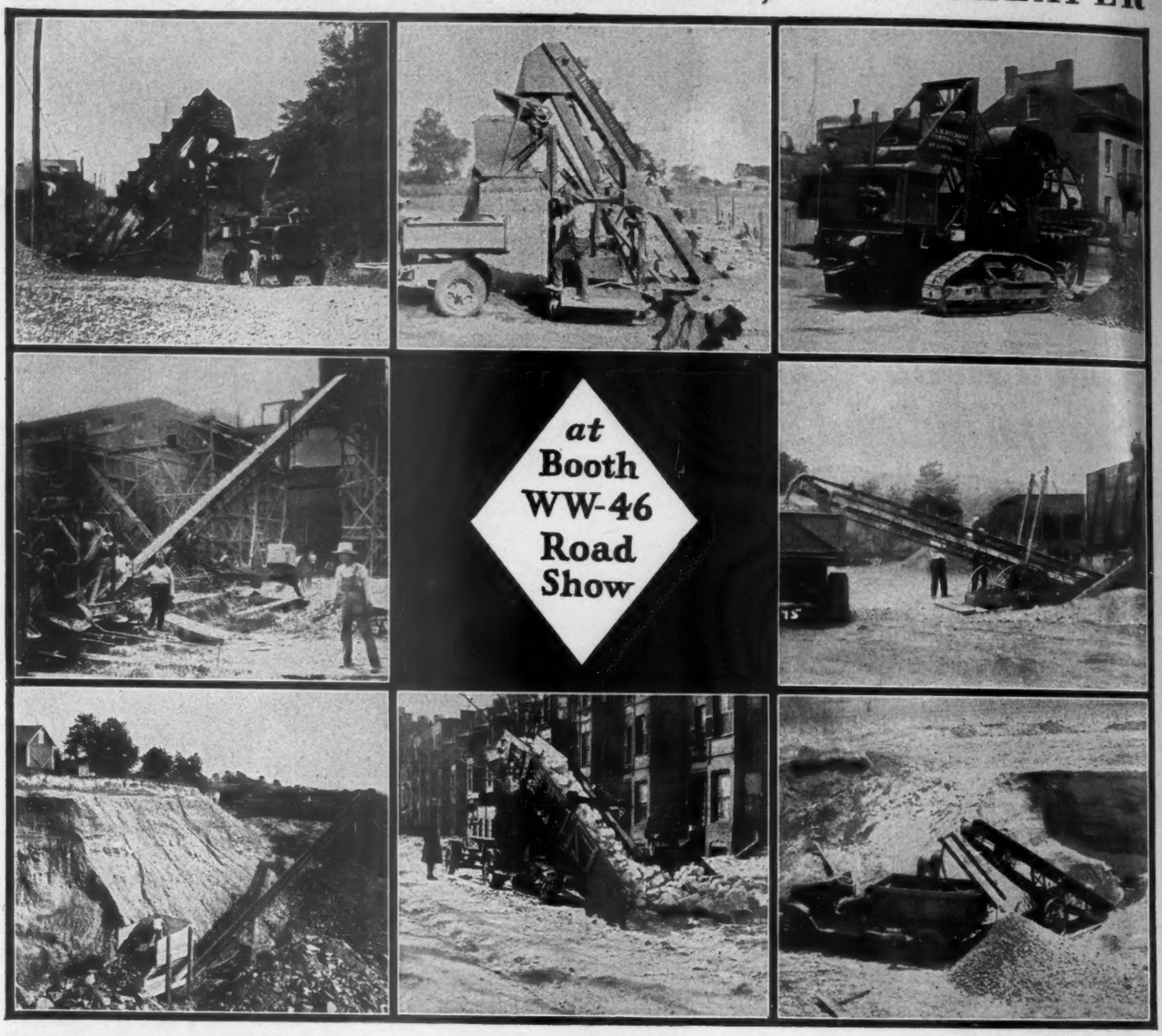

Whether or not 1928 will be a banner year for the construction industry cannot be positively foretold.

But most assuredly, competitive conditions will be more severe than ever.

The vigor of the resulting fight for profits will undoubtedly make obsolete, existing equipment that cannot meet the strict demands of close-margin bids. And new methods will, of necessity, call for closer scrutiny.

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Because of these things visitors to the Cleveland Road Show will find matters of increasing interest at the Barber-Greene Booth. New methods will be demonstrated that can help your handling costs to new low levels.

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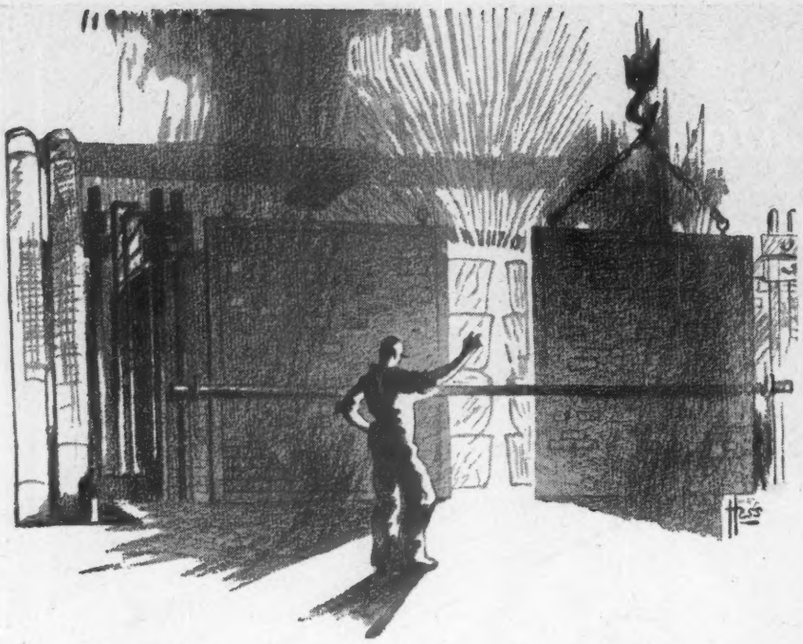

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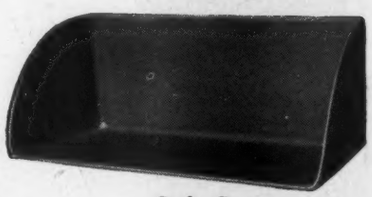

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MILLVILLE, N. J.

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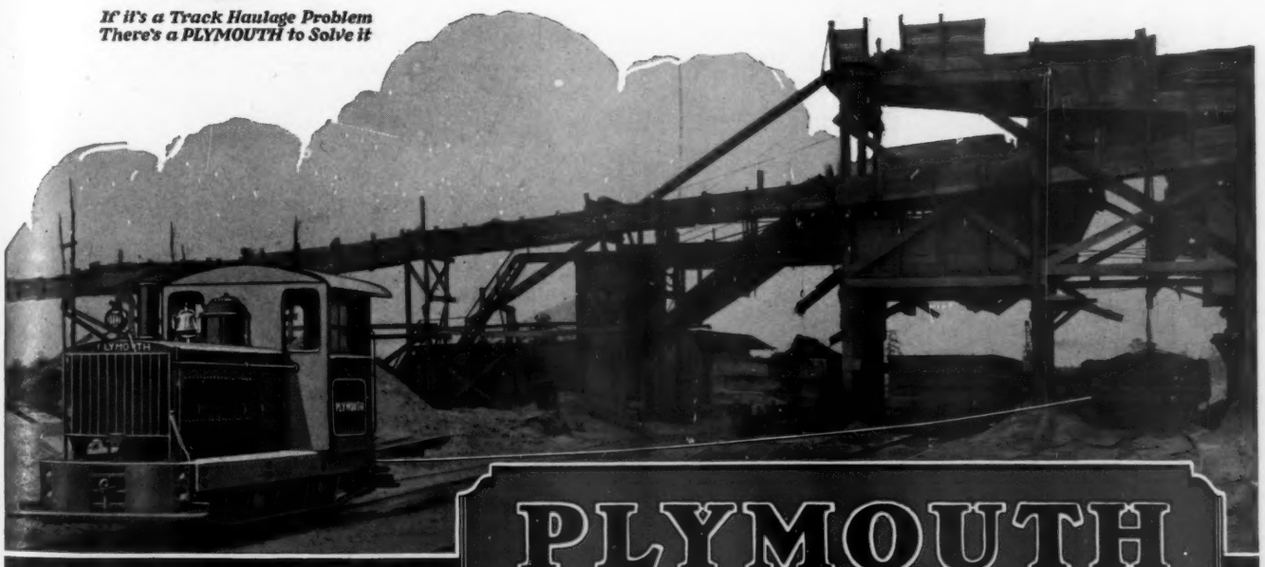

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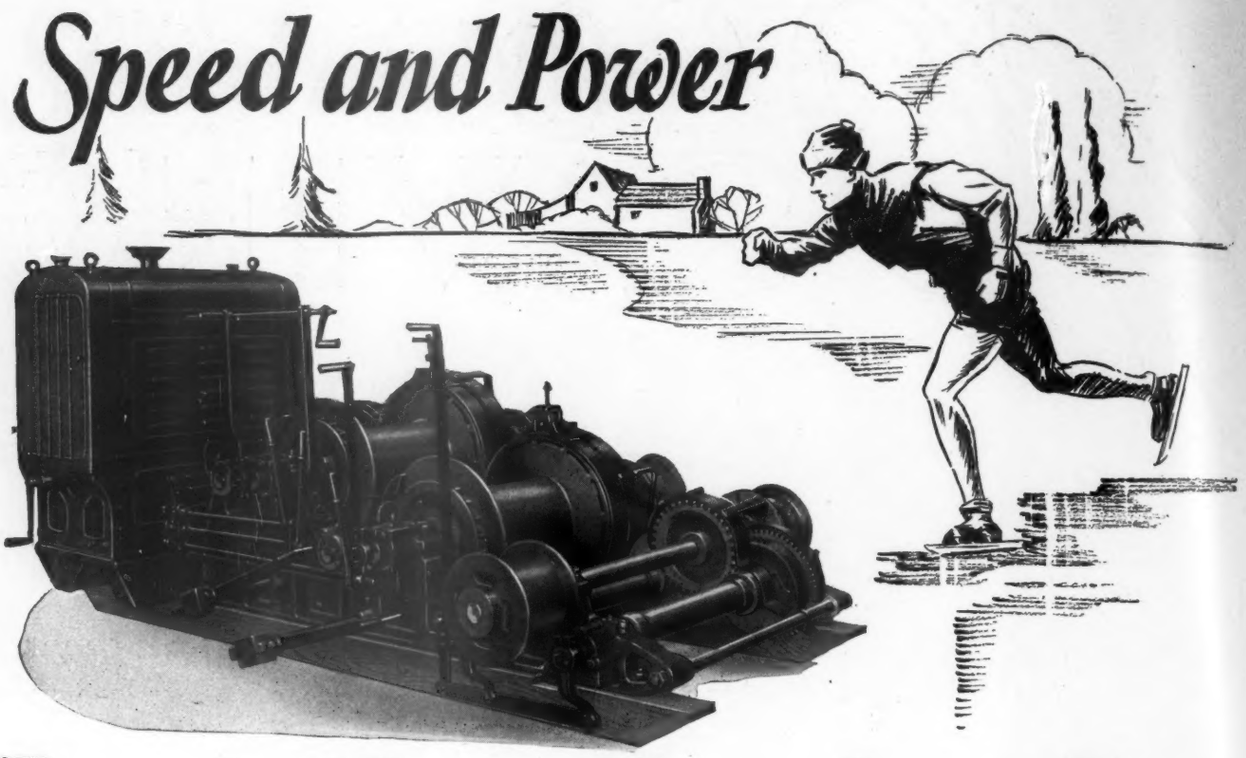

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THE demons of the ice rinks—who are out in front when the flag falls at the finish line—are endowed with generous reserves of speed and power. They not only possess these qualities, but what is absolutely essential to winning form, they have learned to co-ordinate the two so that each is supplementary to the other. Speed or power *alone* is not enough—but put them together and you have a winning combination.

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But in hoists it is not so common. Most hoists are powerful, but most of them are also slow and ponderous. The Mundy Three-Speed Hoist is the champion of its field because it is the only one in which the winning combination of *speed* and *power* has been successfully co-ordinated.

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The Hoist With The Asbestall Frictions

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To increase production, and at the same time show a better percentage of profits—that is the problem which faces many pulverizing plants about to expand their facilities.

Simply adding more units of equipment is not wholly satisfactory, for that merely tends to multiply overhead expense. The efficient solution lies in the use of Raymond

SUPER-MILLS

No. 10—No. 15—No. 25

From 10 to 30 Tons Capacity—to suit your requirements

These are capable of producing, not only large quantities of materials, but large economies in operation. They require no more attention than smaller mills, yet turn out 3 to 5 times the output.

They can be equipped with the Raymond air-drying system and operated like the Kiln-Mill, drying and grinding enormous quantities in a single process.

When fitted with the Pneumatic Feed Control Device, they automatically maintain their maximum capacity, and deliver a uniformly ground product of any desired fineness by means of air-separation.

In numerous big power plants, Raymond SUPER-MILLS are successfully drying and grinding coal for powdered fuel furnaces. They are applicable to other materials, such as gypsum, phosphate rock and products where a "mass production" basis is desired.

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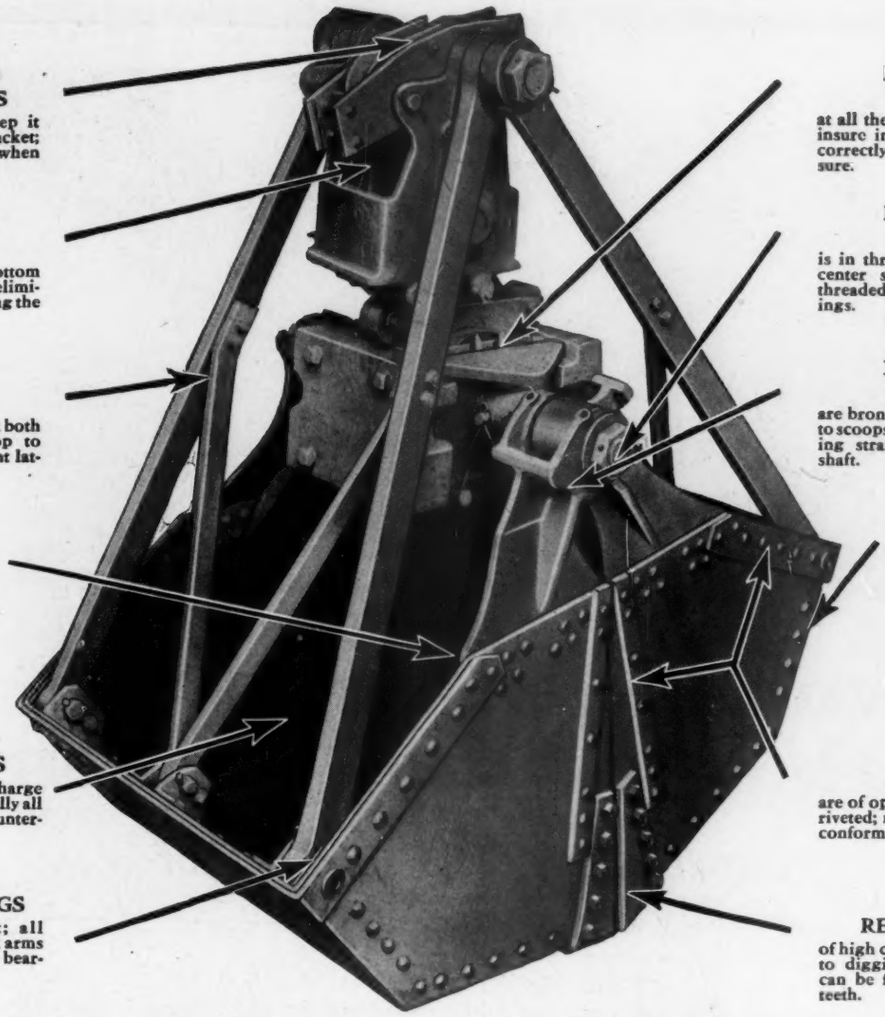

CASE-HARDENED WEARING BLOCKS
guide the cable and keep it from cutting the top of bucket; blocks can be replaced when they are worn.

STRAIGHT LEAD SHEAVES
keep the cable in the bottom of the score; they also eliminate side wear and prolong the life of cable.

FLAT BRACED BACK ARMS
are of extra heavy section; both sides pinned at the top to equalize wear and prevent lateral distortion.

OVERSIZE CAPACITY
is a feature; each size of bucket holds rated capacity at struck level.

SMOOTH INSIDE SURFACES
allow the bucket to discharge material quickly; practically all rivets on inside are countersunk.

REMOVABLE BRONZE BUSHINGS
are used throughout; all sheaves, hinges and back arms are bushed with the best bearing material.

ALEMITE-ZERK FITTINGS
at all the vital wearing points insure injection of lubricants correctly and under high pressure.

MAIN CLOSING SHAFT
is in three sections; only the center section needs to be threaded when replacing bushings.

INTERLOCKING HINGES
are bronze bushed and riveted to scoops, eliminating all bending strains in main closing shaft.

STRAIGHT SIDES
are of great advantage in cleaning up a car and getting into corners.

REINFORCED SCOOPS
are of open-hearth steel amply riveted; metal is distributed in conformance with stresses.

REMOVABLE LIPS
of high carbon steel are bolted to digging edge, which also can be fitted with removable teeth.

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And that's only part of the story. The weight of the Orton bucket is great enough so that it buries itself in the material. The wide spread of the scoops insures a full bucket load every time. Closing action is powerful and speedy, and the smooth inside surfaces affords a lightning-quick discharge. Three trips a minute can be made easily. The straight cable leads reduces the wear on the cable to a minimum.

It's the combination of all these features that makes this bucket so speedy and efficient for digging and handling all kinds of loose materials. Orton owners everywhere are getting added production from their cranes and derricks. Write for names of users in your vicinity, and let them tell you of their success with Orton buckets with these improvements. Built in sizes from ½ to 5 cubic yards. Bulletin on request.

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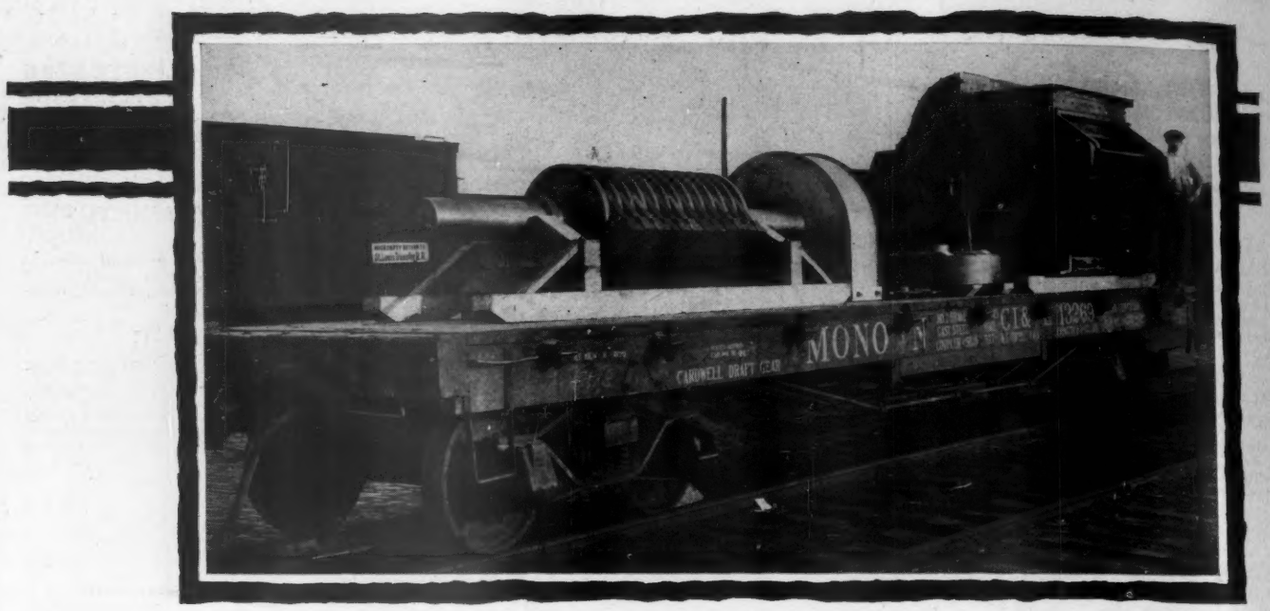

Two like this for Atlas Portland Cement Co.

Capacity 500 Tons per Hour of Wet, Muddy Rock. Will replace Six No. 5 Gyratories

THE big Atlas plant, at Hannibal, Mo., is one more name we are proud to add to the long list of Williams users—a list which includes more than 80% of American cement plants, besides hundreds of quarries and lime and gypsum mills and similar operations.

At the above plant two No. 9 Jumbo crushers will take the product of the large primary breaker and reduce to 1¼ in. in one operation. Six No. 5 gyratories will be replaced by the two hammer crushers and they will handle the material either wet or dry, a difficult operation in wet weather when you consider the large percentage of sticky, clogging overburden and clay they load with their limestone.

The two Williams crushers, however, are especially designed to prevent choking, as the front ends are equipped with electrical heating elements which in wet weather keep the breaker plates hot and prevent adhesion and accumulation of the wet, muddy rock.

If you seek a cheaper, simpler way to crush rock—50% to 75% smaller investment—write us.

and for Commercial Crushed Rock

More Williams hammer crushers for making concrete stone, macadam, ballast and similar sizes were sold in 1927 than ever before.

Dolese Bros., Oklahoma City, recently ordered their THIRD Williams Hammer Crusher.

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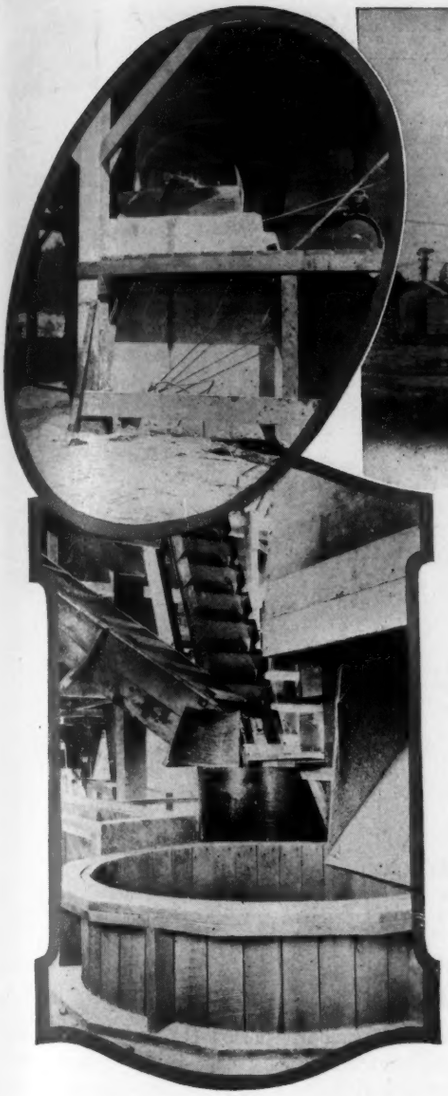

Foley Bros., Inc.
crushing plant, Fort Lee, N.J. designed and equipped by
Telsmith

EXCAVATING for the new Hudson River Bridge required the removal of 500,000 tons of rock—of the hardest kind—trap rock from the Palisades. Foley Bros., Inc. were the successful bidders, largely because, instead of excavating and dumping this rock, they planned to turn it into a profit by crushing it for commercial use.

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How was this made possible? Because the plant was ***scientifically designed*** by Telsmith engineers and ***efficiently equipped*** with Telsmith machinery—everything but the electric motors and the jaw crusher was built in Telsmith's factory.

Telsmith Balanced Service is the result of twenty years' experience. It means an undivided responsibility—your plant will be planned, built and equipped by a single organization—experienced, competent and financially responsible to guarantee results. Bulletin Q. P. 11 tells you ***how.*** Write for it—no cost or obligation.

Here's the Equipment--

Two 30 in. Telsmith Belt Conveyors; Telsmith Scalping Screen, 60 in. by 12 ft.; two No. 13-A Telsmith Primary Breakers (upper left illustration); No. 9 Telsmith Belt Elevator, 80 ft. long (lower left illustration); two Telsmith Heavy Duty Screens, 60 in. by 24 ft.; two No. 40 Telsmith Reduction Crushers (lower left illustration); Telsmith Duplex Bin Gate, 16x16 in.; seven Telsmith Siquad Truck Loading Bin Gates, 20x18 in.; seven Telsmith Duplex Bin Gates, 20x20 in.; seven Telsmith Siquad Truck Loading Bin Gates, 20x18 in.

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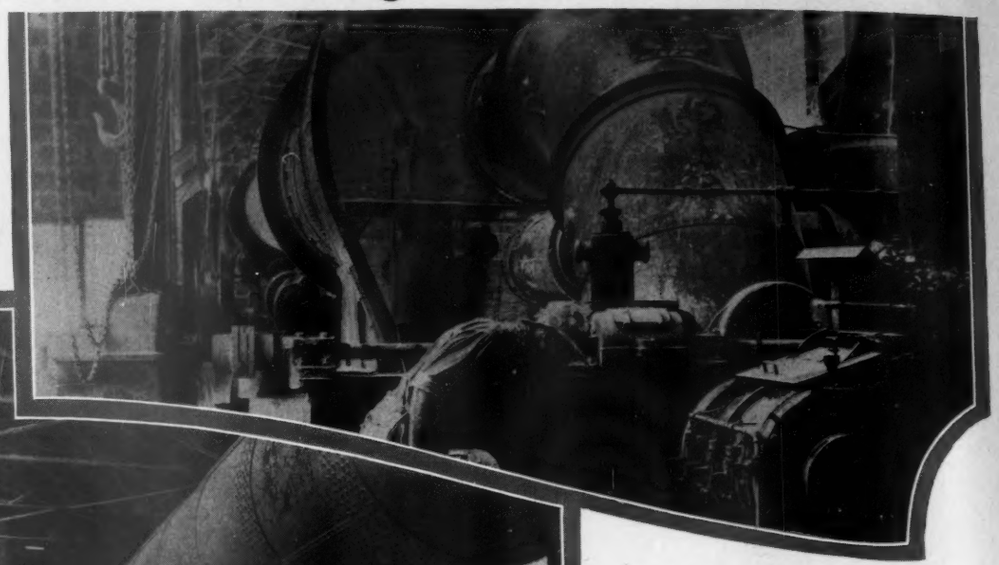
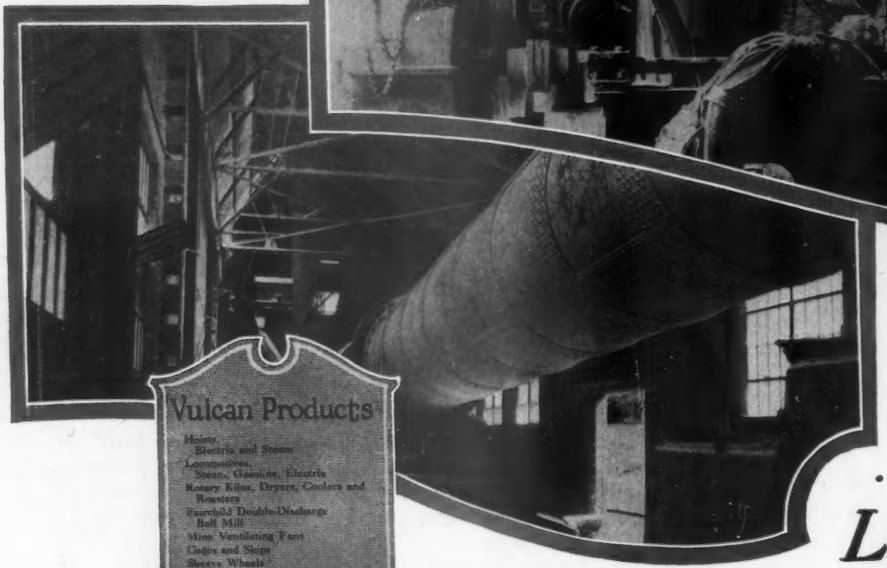
Big Production





Vulcan 9x175 ft. Kiln and 6x45 ft. Cooler in the plant of a prominent lime burning concern.

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Steam, Gasoline, Electric
Rotary Kilns, Dryers, Coolers and Roasters
Fairchild Double-Discharge Ball Mill
Mine Ventilating Fans
Cages and Skips
Sheave Wheels
Corliss Engines
Coal Crushers
Gray Iron Castings
Open Hearth Steel Castings
Gears, Moulded and Cut Teeth
Special Machinery

....at Low Cost

SHOWN above are two photographs of a Vulcan 9x175 ft. Rotary Lime Kiln—the largest size used in lime burning—operating in the plant of a prominent lime burning concern. Working side by side with another make of kiln of the same size, the operators have had a very unusual opportunity to compare performance. The result is that they are more than pleased with their Vulcan equipment.

Lime burning in the rotary type kiln has certain outstanding advantages over the vertical kiln. The rock is burned more uniformly, greater capacity may be maintained, and the operating expense is lower per ton of lime burned. Also, the rotary plant requires the minimum of auxiliary equipment for handling the raw and finished material.

The above Vulcan installation is typical of a number of others in different parts of the world—all of which bear testimony to the correctness of Vulcan Lime Equipment. The broad experience of Vulcan engineers, gained in the solution of hundreds of practical lime plant problems, is at your command.

VULCAN IRON WORKS

Wilkes-Barre, Pennsylvania

50 Church Street
NEW YORK

McCormick Bldg.
CHICAGO

VULCAN *of* WILKES-BARRE
KILNS

Dolomite! operating Twenty Niagara Counterflow Screens

View of Niagara Screen showing panel removed from front end. Panels may be removed from either end, and may be equipped with cloths of different mesh for production of varied sizes.

FOR a crushing plant with a large daily capacity—producing nine sizes of stone—much importance is naturally attached to the efficiency of the screening equipment. And Dolomite, Incorporated, in building a new plant at Maple Grove, Ohio, was careful not to overlook this fact. First, Dolomite, Inc., was after screening equipment that would handle the proposed capacity of the new plant. And second, they were careful to specify screens that would assure fine separations of products on either wet or dry operation.

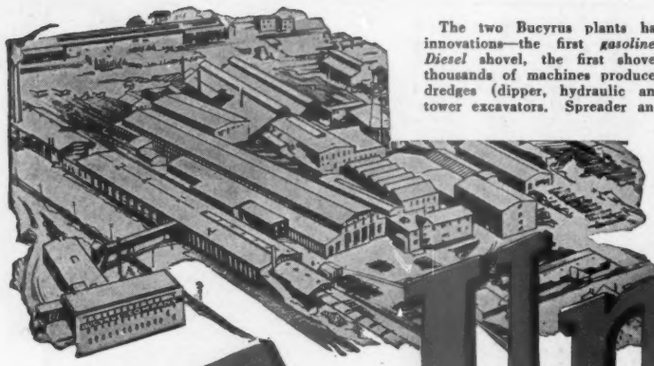
After a careful survey of the requirements necessary for efficient handling of the huge daily screening operations, it was quite a natural result that Dolomite officials decided upon Niagara (Ball-Bearing) Counterflow Screens. TWENTY of these screens have been installed in this new and thoroughly modern crushing plant.

In present day practice, absolute accuracy is demanded in the sizing of your coarse, intermediate and fine products. Niagara (Ball-Bearing) Counterflow Screens insure correct sizing with large capacity on either wet, damp or dry material.

Complete details on request

Niagara Concrete Mixer Co.

40 Pearl Street, Buffalo, N. Y.



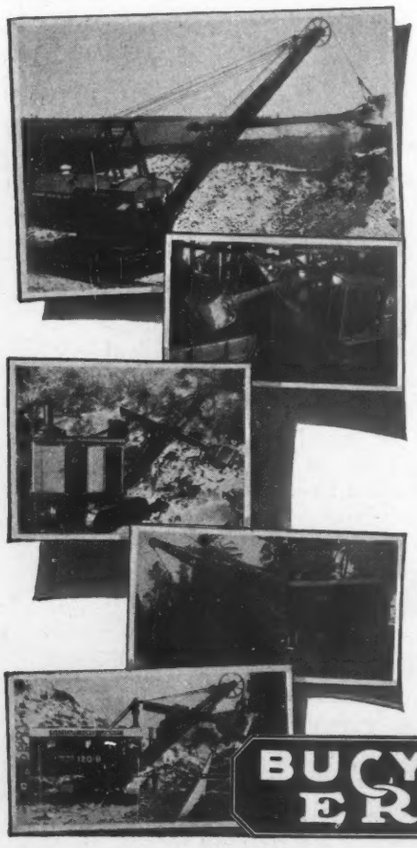
South Milwaukee, Wisconsin

The two Bucyrus plants have produced—together with many other innovations—the first *gasoline* shovel, first *electric* excavator, first *Diesel* shovel, the first shovel with *caterpillar type mounting*. The thousands of machines produced include shovels, cranes, and draglines, dredges (dipper, hydraulic and placer), railway cranes and ditchers, tower excavators. Spreader and ballast plows.

Evansville, Ind.

A Union of

A Complete Line of Excav backed by Unequalled M and Service



STARTING with the New Year, this powerful new company carries on the combined business of Bucyrus Company and Erie Steam Shovel Company—

With plants and organizations which, combined, have built nearly twice as many excavating machines as any other manufacturer.

Never before has such a fund of sound and reliable experience been concentrated on one line.

For many months BUCYRUS-ERIE engineers have worked out new features and designs that mean *extra value to the buyers of shovels, cranes, draglines, dredges, ditchers, etc.*

The customer of BUCYRUS-ERIE can safely count upon—

(1) Unequalled values, made possible by manufacturing facilities that stand alone in this field.

BUCYRUS ERIE

BUCYRUS-ERIE
South Milwaukee, Wis.
Branch Offices and

Strength

BUCYRUS ERIE

Erie, Pa.

"BUCYRUS" and "ERIE" Consolidated Jan. 1, 1928

The Erie plant developed the first *Gas+Air* shovel—the most efficient of gasoline shovels. It has produced the greatest number of excavating machines of one size and type—a total of more than 4,200 Steam ERIES, besides over two hundred Gas+Air machines. It is here that modern quantity production methods were first applied to the manufacture of excavating machines.

ating Machines and Cranes anufacturing Experience Facilities

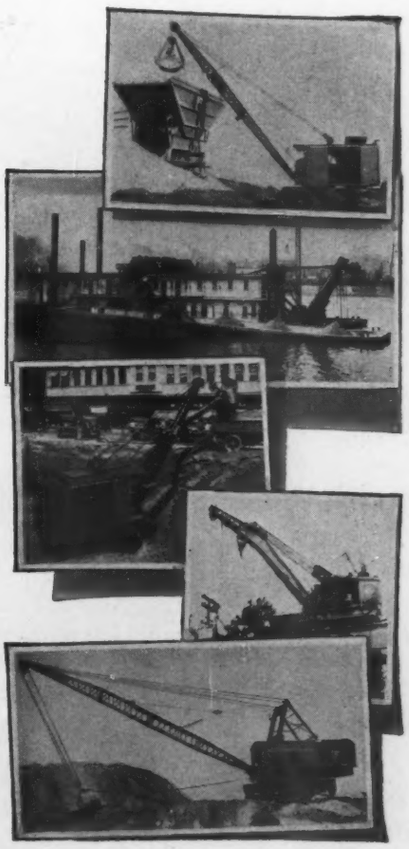
(2) More efficient machines, **perfected by an unequalled experience.**

(3) Assured permanence **of the manufacturer. Bucyrus Company was organized 1880, the Erie Company in 1883. The marked success of both companies gives full confidence that the combined organization is in business to stay, standing back of any product you buy.**

(4) More complete Service **than it is possible to give when operating on a smaller scale—the most complete service and sales organization in the field.**

The future of BUCYRUS-ERIE machines can be judged by the success of "BUCYRUS" and "ERIE" products in past years.

With such a solid foundation to build on, our every endeavor will be to reach new heights in service to the user of excavating machinery.



COMPANY

Erie, Pa. Evansville, Ind.

Representatives Everywhere

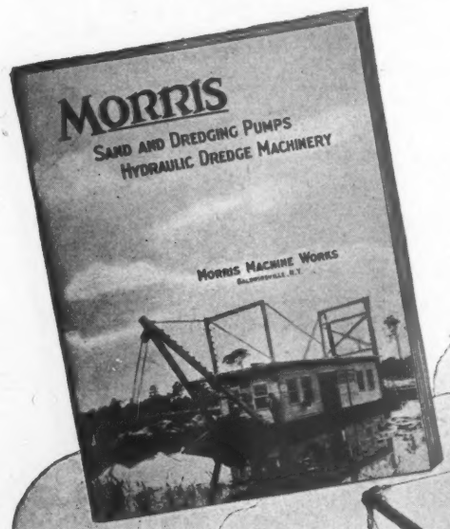
Helping the Central Dredging Company of Chicago to handle sand and gravel at very low cost

FOR seven miles along the Chicago Lake Front, the South Park Commissioners are placing a fill varying in depth to 15 ft. and in width from 800 to 1500 ft. In this work, the Central Dredging Company has used the Sand Sucker "Bay View" to obtain and transport as much as 100,000 cu. yd. of sand per month from pumping grounds 15 miles out, and deposit this sand through lines varying up to 4000 ft. in length.

The "Bay View" is a converted whaleback of 1500 cu. yd. capacity with two 18-in. steam-driven Morris Dredging Pumps working in parallel in loading and in series in unloading, an arrangement which permits quick work through long delivery lines.

Mr. E. M. Graves, President of the Central Dredging Company, states that during three years operation, the Morris Pumps have required few renewals and have been very satisfactory.

If you have a dredging, filling or sand production problem where plenty of water is available, hydraulic handling and Morris Pumps will enable you to make the biggest profits. Our Engineers will tell you why and how, and Morris Dredging Booklet No. 125 will show you many suitable outfits. Tell us your needs or at least ask for a copy of the booklet.



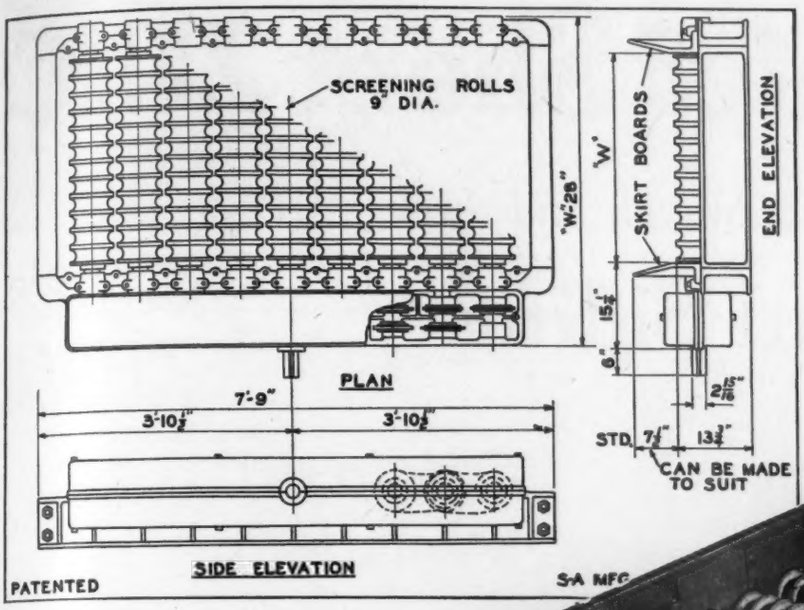
WRITE FOR THIS BOOKLET

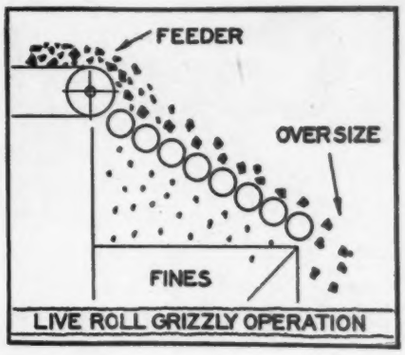
MORRIS MACHINE WORKS, Baldwinsville, N. Y.

Originators of centrifugal pumps, both single and multi-stage, and builders for practically all purposes since 1864

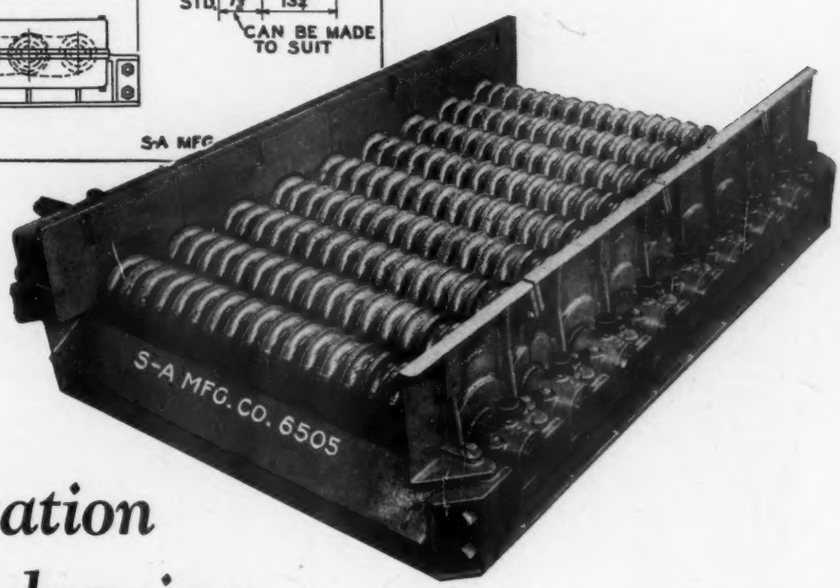
Branch Offices: New York, 26 Cortlandt St.; Philadelphia, Witherspoon Bldg.; Cleveland, 1367 E. Sixth St.; Chicago, 217 N. Jefferson St.; Boston, 79 Milk St.; Pittsburgh, 320 Second Ave.; Detroit, Penobscot Bldg.; Charlotte, Realty Bldg.
Sales Representatives: Buffalo, Denver, Salt Lake City, Huntington, W. Va.; Houston, Kansas City, Omaha, Portland, Ore.; Los Angeles
Canada: Storey Pump & Equipment Co., Toronto

See our exhibit at A. R. B. A., and Nat'l Sand and Gravel Association Shows.





Drawing shows approximate dimensions of the "Live Roll" Grizzly, made in 24 in. to 60 in. widths.



Rapid Separation without clogging

The "Live Roll" Grizzly embodies a scalping principle that insures rapid separation and therefore large capacity.

Material is carried up and down over rotating spools, which are grooved to allow the fines to settle through. Each successive spool rotates slightly faster than the preceding roll, thus there is positively no danger of grinding or clogging. As it progresses toward the end, the material is thinned and spread over the entire width of the scalping surface.

Bulletin No. 149, describing the "Live Roll" Grizzly, will be sent upon request.

Stephens-Adamson Mfg. Co.

Designers and Builders of Labor Saving Material Handling Machinery

Pacific Factory **Los Angeles, Calif.** *Main Office and Plant* **Aurora, Ill.** *Canadian Factory* **Belleville, Ont., Canada**

Corrugated Sheet ZINC

—zinc through and through—

Roofing and Siding

New Jersey Zinc

New "East River Station," The New York Edison Co., where Corrugated Sheet Zinc permanently protects the coal tower and conveyor gallery.

Industry's Permanent Insurance Against Repair and Replacement

Industry has paid a terrific price for using materials that rust. Continuous repairs and replacements, added to original cost, make a staggering total—a cost which engineers cannot sanction in these days of keen competition.

Engineers are now using Corrugated Sheet Zinc for roofing and siding. They have learned that the first cost is the last expense. And the first cost is not high. Figured over its life of service, Corrugated Sheet Zinc—zinc through and through—is the most economical metal housing you can use.

Before you build, figure it in Zinc. You will be pleasantly surprised at the costs. Our engineering services are at your command—why not investigate the savings?

Send for the specification Book. It tells the whole story of the most economical roofing and siding you can buy.

THE NEW JERSEY ZINC CO., 160 Front St., New York City

Send me information on the use of Corrugated Sheet Zinc for roofing and siding for:

Type of Building.....

Firm.....

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The New Jersey Zinc Company

(Established 1848)

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Typical buildings in the cement and other branches of the rock products industry which may be constructed of Corrugated Sheet Zinc:

Rock Storage
Crusher Buildings
Power Plants
Mill Buildings
Bag Houses
Conveyor Galleries
Powder Magazines
Warehouses
Machine Shops
Car Repair Shops

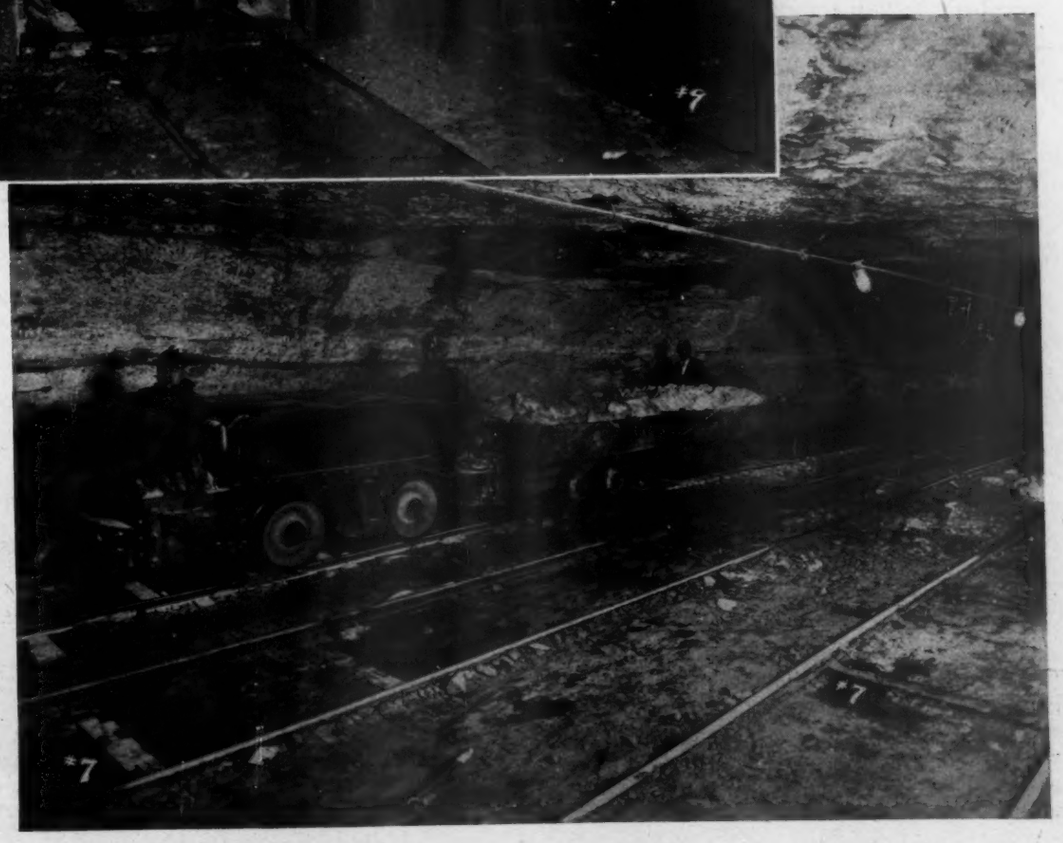
Rock Products

CEMENT and ENGINEERING NEWS

With which is Incorporated — Founded 1896

Volume XXXI — Chicago, January 7, 1928 — No. 1

A loaded mine car entering the electric lift cage to be raised 60 ft. to the surface —National Gypsum Co.'s mine at Clarence Center, N. Y.



One of the spacious rooms in the mine. The train of cars is on its way to the lift cage shown above

Sand and Gravel Producers Meet in Convention at Detroit

A Successful Exhibit, Excellent Papers and Unusual Social Features Mark Meeting of the National Association

NO PREVIOUS convention of the National Sand and Gravel Association has been given such excellent and continuous advance publicity as that which closed its sessions January 6 at Detroit. The results were shown in the excellent attendance, the fine exhibit and above all by the unusual social features. These broke all records for this association, and the comments heard everywhere throughout the meeting showed that the work was appreciated by the members and their friends.

This success was due to the work of Charles H. Ray of the Ray Sand and Gravel Co. of Detroit and his associates, the producers of the Detroit district, who gave so unstintedly of their time and effort for weeks before the convention met.

The 12th annual convention of the National Sand and Gravel Association convened at the Book-Cadillac Hotel, Detroit, Mich., January 4. President Hugh Haddow, Jr., opened the meeting with a brief talk in which he welcomed the members and guests. He paid a well deserved tribute to the work of the Washington office and spoke especially of the success of the machinery exhibit. Then he told the members that the convention was in their hands and that its success would depend upon them.

Charles H. Ray, of the Ray Sand and Gravel Corp., of Detroit, the chairman of the committee to whose activities much of the success of the convention is due, introduced Joseph E. Maris, commissioner of purchases and supplies for Detroit, who made the usual formal speech of welcome. Mr. Maris appeared to know more than the usual layman about the sand and gravel industry and spoke of the large and efficient plants producing in the Detroit territory which, he assured the members, were well worth a visit.

Producers and Machinery Men Lunch Together

At noon members and associate members met for luncheon and to discuss operating problems, with J. L. Shiely presiding. Mr. Shiely turned the meeting into a "get acquainted" affair, with a number of good stories and by introducing a lot of the old timers who followed his lead when they were called upon to speak. Stephen Stepanian of the Arrow Sand and Gravel Co., passed from table to table with a sample sack and threw a few grains of what appeared to be pea gravel on each table, inviting the members to note what an excellent product his new plant made. The resemblance to gravel pebbles was so good that almost everyone had to be told that the pebbles were candy.

In spite of the fun, this session had its serious moments. Mr. Shiely spoke of the value of contacts between machinery men and producers and said that many of the operating problems of the industry were

R. C. Fletcher, newly elected president of National Sand and Gravel Association

solved in that way. John Prince said that he hoped that no more high-pressure salesmen would come into the Kansas City territory, as that part of the country had all the sand plants it could accommodate and more. President Haddow said he had only one serious operating problem, one which he understood was bothering a good many other members of the association, and that was how to make gravel from sand. Mr. Stepanian made a good short talk in which he pointed out that the final aim of the association was, after all, that of other associations of cement and aggregate producers, the making of aggregate of such high quality, that the concrete made from it would be strong and permanent.

The one talk of any length was given by T. E. McGrath, of the McGrath Sand and Gravel Co., Lincoln, Ill., on over-production in the industry. The Illinois state association, in which Mr. McGrath is a leading member, is possibly more concerned than any other large local group in this matter and has done what it could to keep over-production down by discouraging the building of new plants. Among other things, it has corresponded with the presidents of twelve railroads that serve Illinois producers and tried to convince them that railroads were just as much interested as producers in seeing that no unnecessary plants were built. He read parts of several letters from these railroad presidents which showed that they recognized that as over-production increased a more determined effort would be made to put down railroad freight rates, and for this reason, as well as because they recognized that a disorganized industry would be bad for everyone concerned, the railroads were quite in sympathy with the producers. Every letter said that the railroads wished to co-operate with the producers, although some asked that concrete plans should be formed before the roads were asked to commit themselves. One railroad president suggested that the matter be put before the bankers' associations. Bankers, he said, would be appreciative, as the banks had lost about as much as the producers of coal from the over development of the coal industry.

Mr. McGrath gave one instance in which the building of an unnecessary plant had been headed off by co-operation of the producers and the railroads. At the solicitation of the producers the traffic manager of one of the railroads had placed the figures of production and shipments before the intending producer, who promptly decided not to build.

Board of Directors Meeting

The greater part of the opening session of the board of directors was given up to the discussion of a proposal made by J. L. Shiely to change the offices of the association from Washington, D. C., to Chicago, Ill. Mr. Shiely gave some fairly good reasons for making the change, the principal one being the convenience to the members. The reasons why the offices were originally located in Washington

(concerned with priority orders during the war, and later with car shortages) no longer exist, and it was his opinion that the offices should be in a more accessible place. A number of the directors said that they favored the change. It was decided to have the executive committee prepare a report which it might submit to the board later.

J. R. Thoenen, of the nonmetallic experiment station of the Bureau of Mines, was present and brought an offer from the bureau to carry out studies of any operating problems of a technical nature that the association might suggest. He also spoke of the advisability of conducting a study of production costs, which the bureau would be glad to undertake. After some discussion, it was agreed to leave the matter in charge of a committee which would report to the executive committee, making such recommendations as they saw fit. John Prince, T. E. McGrath, and F. D. Coppock were appointed as this committee.

Earl Zimmerman, president, Ohio Gravel Ballast Co., as chairman of the budget committee presented the budget for 1928 which the committee had prepared. This showed an estimated income of $47,989.93, with an estimated reserve, at the end of 1928, of $12,290.80. The anticipated expenditures for 1928 are: Executive division, $17,370.00; office administration, $7,580.00; *National Sand and Gravel Bulletin*, $7,000.00; engineering and research division, $14,150.00; total, $46,100.00, which is about $4000.00 more than was spent in 1927.

The budget caused some discussion, but after the committee had explained some matters in connection with it, it was adopted as presented. The financial report showing the present condition of the association was adopted as read and the officers of the association were congratulated by a vote of the board on the excellent showing that had been made.

The proposal to install a laboratory for the engineering and research division caused considerable discussion, as the matter has become complicated by the proposal to change the offices of the association from Washington to Chicago. A considerable amount has already been received from individual and local association subscriptions. It was decided that when these subscriptions had reached a certain amount, the executive committee would order the installation of a laboratory.

Report of the President

A brief review of his two years as president, during which the Washington office of the association was reorganized, the engineering bureau established, and a treasury surplus accumulated, was the subject of a short address by Hugh Haddow, Jr., which opened the second day's session. President Haddow complimented those responsible for the growth and development of the exhibit feature of the convention, which now forms a real educational factor, as well as promotes fraternity and good fellowship.

The establishment of a research laboratory at Washington would soon be an accomplished fact, President Haddow said, but he warned all that its accomplishments would be dependent on the support given by the membership.

During 1927 the increase in membership was 8%, and the additional funds thus made available permitted the association to have the largest and most useful staff at Washington, that it had ever had. President Haddow closed his remarks with generous compliments to his associates who had aided in thus building up the organization.

Telegrams were read from absent members and friends, including a very cordial one from Otho M. Graves, president of the National Crushed Stone Association, extending a welcome to the West Baden, Ind., convention of that organization to every sand and gravel producer who might care to come.

Charles H. Ray, general chairman of convention committees

Hugh Haddow, Jr., retiring president of the association

J. L. Shiely, retiring after long service as officer and executive committeeman

Earl Zimmerman, re-elected secretary-treasurer

Report of the Executive Secretary

The report of V. P. Ahearn, executive secretary, contained these high points:

"Our report submitted at the last convention stated that the *National Sand and Gravel Bulletin,* the official publication of the association, was well on its way toward being self-supporting. This latter condition has not only been achieved during 1927, but the *Bulletin* has shown a surplus. Under these circumstances, we have definitely decided to increase the circulation of the magazine in order that full effectiveness may be realized. We hope also to increase the size of the publication and, as future developments warrant, to add to its editorial staff.

"Another subject which is appropriate at this time is the introduction of the machinery exhibition idea at conventions of the association. Our first exhibition was held one year ago in conjunction with the convention at Cincinnati. Every available booth was reserved by prominent manufacturers interested in the sand and gravel field. This record has been duplicated for the exhibition at the Detroit convention, even though we increased the amount of exhibit space by about 25%. This is a positive indication of the success of the first exhibition at Cincinnati, and gives us reason to believe that a display of modern engineering equipment for use in the production of sand and gravel is a feature which is of distinct educational value to the men of the industry. A manufacturers' division of the association has been formed, and the members of that division have been freely consulted in arranging for the 1928 exhibit.

"Prospects for 1928—Reliable estimates indicate that sand and gravel production in 1927 increased approximately 6% over 1926, although some sections of the country reported a decrease in production. Nothing appears on the business horizon for 1928 which would lead us to anticipate anything but a successful year. This is especially true with reference to highway work in several states. The demand for our products for structural building also promises to be good. General prosperity in the United States is inevitably accompanied by intensive building activity, and although 1928 is one of the so-called presidential years when business in the past was presumed to lag, this fallacy is no longer the source of concern. The surveys of many leading business organizations point to a continuation of the present prosperity.

"Overproduction Problems— During the year 1927 much consideration has been given by individual groups of sand and gravel producers to the future of the industry. Several of these have agreed that the present potential capacity of established sand and gravel plants is more than sufficient to meet any normal market demand. It was felt, therefore, that the sand and gravel industry should take advantage of every legitimate means at its disposal to acquaint the public with the fact that existing plants are more than capable of supplying any demand which may be placed upon them. Two state associations have addressed letters to the railroads serving their territories, calling their attention to these facts and enlisting their co-operation in giving them adequate publicity. The results have been encouraging.

V. P. Ahearn, executive secretary

"Cost Accounting—The question of a more fitting stabilization of the established sand and gravel industry is one which is engaging the serious attention of everyone connected with it. It is the belief of a large group that the foundation on which stabilization must rest is accurate and comprehensive cost accounting.

"The logical agency to entrust with the preparation of a uniform cost accounting system for the industry is the National Association. Some preliminary studies have already been made and we have been in communication with a responsible accounting firm of national reputation which is equipped to devise a system which could be adapted to the requirements of every producer. It is realized that a large percentage of the industry has used accounting systems for a great length of time, but it should be remembered that there are others who would welcome a scientifically prepared method of keeping costs. No provision has been made in the 1928 budget of the association for carrying out such an activity, but we offer the subject for consideration at this time, with the hope that suitable action can be taken at an early date.

"Southwestern Rate Case—By an order dated June 13, 1927, the Interstate Commerce Commission instituted an investigation into intrastate and interstate rates on sand, gravel, crushed stone and related commodities in Texas, Louisiana, Arkansas and Oklahoma. The commission stated that it was their intention to use the proceedings as a means of fixing a scale of rates on these commodities for general adoption in the Southwest.

"As it was imperative for Southwestern producers to take some steps immediately to protect their interests, the national association arranged a meeting of the industry, at which time steps were taken for the employment of traffic counsel to present a united case to the commission, in co-operation with the crushed stone producers who were affected in equal measure. The action of the national association in this case was in line with the policies followed in handling the Western rate case, described in detail in the last report of the executive secretary.

"The Southwestern case is but the forerunner of a concerted effort to bring all sand and gravel rates in the country under investigation. It may reasonably be expected that for the next several years the industry will experience litigation designed to "standardize" the sand and gravel rate structure. The administration has declared that "competent authorities agree that an entire reorganization of the rate structure for freight is necessary, and this should be ordered at once." Our industry and related industries seem to be among the first to be selected for scrutiny, and it is the part of wisdom for every producer to keep closely in touch with developments and to co-operate with others in his business in avoiding the imposition of unreasonable rate burdens. The association stands prepared to render assistance to other groups which are confronted with proposals similar to the Southwestern rate investigation.

"Insurance—After an extensive survey by the United States Employes' Compensation Commission, instituted as the result of a formal request by the national association, it was decided that the crews of dredges and barges in sand and gravel dredging operations and employes operating stationary winch engines upon floats, alongside of or attached to sand and gravel docks, in connection with unloading operations, are not subject to the provisions of the Longshoremen's and Harbor Workers' Compensation Act. It was further held, however, that laborers not members of the crew assisting in unloading sand and gravel barges are in maritime employment within the meaning of the law while working on the dredges or barges.

"A rather limited investigation also discloses the possibility of securing a down-

ward revision of fire insurance rates in sand and gravel operations. Under present schedules now in use in the eastern part of the country, sand and gravel appears to be in the same classification with other industries where the fire hazard is much greater. We intend to go into the question more thoroughly in 1928 and, when our investigation is completed, to make suitable recommendations to the board of directors with respect to formal action by the association.

"The general question of insurance brings to mind the fact that much can be accomplished in the way of reducing compensation rates in all sand and gravel operations. The first step in that direction, manifestly, lies in safety precautions about the plants. Sources of danger can be eliminated and a sincere effort can be made to avoid preventable accidents. Of course, we should see to it that no rate is fixed in any state which is clearly out of reason and which is inconsistent with the normal conduct of the business of the sand and gravel industry.

Engineering and Research Division

The report of Stanton Walker, director, of the Engineering and Research Division of the National Sand and Gravel Association, contained the following high points:

"The activities of the Engineering and Research Division may be classified roughly under the following subdivisions:

"1. Preparation of literature giving information concerning the use of prepared sand and gravel.

"2. Distribution of information through talks delivered before groups of engineers, contractors, sand and gravel producers, etc.

"3. Distribution of information through correspondence in response to inquiries received from both those within and without the industry.

"4. Representing the sand and gravel industry in engineering societies and in committees engaged in preparing specifications which affect the industry.

"5. Co-operation with various organizations carrying out researches having a hearing on the sand and gravel industry.

"6. Rendering direct engineering service to member companies.

"7. Studying test data to develop information concerning sand and gravel.

"8. Inspection of construction involving the use of sand and gravel.

"During the past year we have discussed the use of prepared sand and gravel and the work of the association before the following organizations:

"Northwest Branch, Associated General Contractors of America, annual convention, at St. Paul, Minn.

"Associated General Contractors of America, annual national convention, at Asheville, N. C.

"New Hampshire Good Roads Association, at Concord, N. H.

"Massachusetts Sand and Gravel Association, at Boston, Mass.

"Michigan Sand and Gravel Association, at Detroit, Mich.

"Ohio Sand and Gravel Association, annual meeting, at Columbus, Ohio.

"Missouri Valley Sand and Gravel Association, annual meeting, at Kansas City, Mo.

"Wisconsin Mineral Aggregate Association, annual meeting, at Milwaukee, Wis.

"Correspondence—Some idea of its volume may be gained from the fact that this

Stanton Walker, director, engineering and research division

division has written something over 2500 letters, about 75% of which were originated by producers and users of sand and gravel. A large proportion of the latter class contained requests for information.

"Representation in Engineering Societies and Committees—Close contacts have been maintained with the work of the various engineering societies. Association or individual memberships are maintained in the following organizations:

"American Society for Testing Materials.

"American Concrete Institute.

"American Society of Civil Engineers.

"American Society for Municipal Improvements.

"American Railway Engineering Association.

"Co-operation with Research Organizations—Co-operation with research organizations should rank close in importance to that of representing the industry in committee work. Many different researches are being carried out which involve studies of sand and gravel, but which do not have for their primary object the solution of problems of our industry. In certain cases we have been able to make suggestions which have made it possible to obtain more specific information on questions of particular interest to the industry and in certain instances we have been able to correct what seemed to be erroneous conclusions by suggesting other tests to clarify the question further.

"Our experience has been that research organizations are glad to receive our comments on data involving the use of sand and gravel, and this circumstance gives us an opportunity to state our case, sometimes before the researches are started, or before the results are made generally available. A considerable number of opportunities have been offered to co-operate in this manner. Examples are, co-operation with the Bureau of Public Roads in securing aggregates for special tests and suggestions offered to the Portland Cement Association and other organizations, at their request, for subjects for research. Other examples would require a more detailed description than feasible in this report.

"Engineering Service to Members—Direct engineering service has been rendered to members in a considerable number of cases during the past year. Work of this nature is considered to be of special importance since it directs the association's work along lines of most immediate benefit. Among the examples which may be cited are the following:

"(1) One of our member companies has had difficulty in disposing of his sand for use in highway construction because of its grading, in spite of the fact that it is an excellently graded material. A thorough discussion of this problem with the engineers of the highway department of that state brought about immediate temporary measures which partially relieved the situation and it seems likely that permanent relief will be afforded before the beginning of the next construction season.

"(2) The sand of a member was being rejected by the field inspector and, after delay and accumulation of demurrage charges, accepted on tests carried out at the state highway department's laboratory. An investigation disclosed a fundamental error in the method of making the field test, and a demonstration of the correct method resulted in eliminating the difficulty.

"(3) A concrete highway was placed under circumstances which made it desirable that complete information be obtained on the quality of materials used and on the construction methods. The writer remained on the job during the construction and later submitted a report on the materials and methods.

"(4) Strength tests, abrasion tests, sieve analyses, etc., have been carried out at the request of member companies in several instances.

"(5) Tests of yield of different types and gradings of aggregates in concrete were made at the plant of a member and a report submitted, giving quantities and costs of materials per cubic yard of concrete.

"In addition to work such as that listed,

there is a great deal carried on by correspondence which would properly come under this classification and which has been discussed in sufficient detail in another place in this report.

"Studies of Test Data—Correlation of existing test data referring to sand and gravel has continued to be an important branch of our work.

"The Inspections of Construction Involving Use of Gravel—A number of inspection trips have been made for the purpose of observing construction where gravel has been used as the coarse aggregate.

"Plans for Future—It is planned to continue the general activities of the nature described in this report along very much the same lines as have been followed this year. It is hoped, of course, that more and better work can be done.

"Plans for extending our work by the addition of a research laboratory, which were discussed briefly in our last year's report, seem to be nearing consummation. The board of directors of the national association, at its meeting in Chicago in June, authorized the executive committee to canvass the membership of the association with a view to obtaining special funds, through voluntary subscription, for the establishment of a laboratory at the association's headquarters in Washington and for its operation until such time as the regular income of the association is sufficient to support the new work.

This action was taken after careful consideration of a report submitted by a committee, consisting of Fred D. Coppock of the Greenville Gravel Corp. (chairman), A. W. Dann of the Keystone Sand and Supply Co. and John Prince of the Stewart Sand Co., appointed for the purpose of making a study of the desirability and feasibility of establishing a laboratory in which the problems of the sand and gravel industry can be investigated.

"While it cannot be said that there has been a general response from the membership, sufficient subscriptions have been received so that it seems that the desired amount will be obtained when the membership as a whole realize more completely the value of research work."

Transportation

M. J. Gormley, chairman, Car Service Division, American Railway Association, Washington, D. C., reviewed the transportation situation with particular reference to recent rules requiring the immediate return of coal cars to the Norfolk and Western and other coal-carrying roads. This order has worked some hardships on a few sand and gravel producers, particularly at Detroit and Chicago, where some of the railways had been accustomed to hold these coal cars for sand and gravel service. Mr. Gormley said, however, that if these railways would provide suitable equipment of their own for this traffic, as most of them were doing, there would be no further trouble on this score. Mr. Gormley explained the necessity of this order, and its fairness to the coal carrying roads. He said it was undoubtedly a permanent order.

Some very interesting figures on the growth of the sand, gravel and crushed stone car loadings were included in Mr. Gormley's talk. From 1923 to 1927, inclusive, there was an increase of 33% in this traffic. Actually there were no more cars in service in 1927 than in 1923, but the greater capacity of present-day cars and the great increase in efficiency in handling them without demurrage made it possible to move 800,000 more carloads in 1926 than in 1920. From 1923 to 1926 there was an average increase in the carload carried of approximately 1 ton.

Mr. Gormley said there need be no fears for the future, so far as the ability of the railways to handle sand and gravel traffic was concerned, unless some unforseen event reduced the income of the railroads to a point where they could not afford adequate facilities. He ended his remarks by complimenting very highly the ability and the diplomacy of Secretary Ahearn in handling the cases of sand and gravel producers with his office in Washington.

Construction Outlook for 1928

T. S. Holden, vice-president, F. W. Dodge Co., New York City, took a very interesting and difficult subject, with graphs and statistics—construction economics—and made it very interesting and enlightening. Starting with an explanation of where money for construction comes from (capital or investment money) he traced the relation of corporate bonds, public works, bonds, interest rates and bank transactions with construction activity.

Construction work was divided into two general classes (1) private construction and (2) community construction (public works). By means of graphs covering a period of several years he showed how the monthly totals of corporate bond issues private funds) preceded the fluctuations in the volume of private construction work by about a year. In other words, there is about a year between the floating of these securities and the activity in construction which is at least partially dependent on them. At the present time the corporate bond issue curve is up, while the construction activity curve has just started to rise. This is interpreted to mean an increase in private construction projects in 1928.

The relation between community bond issues and community construction showed a lag of about three or four months between the two, the bond issue curve, of course, preceding the construction activity curve. From the relations thus established he predicted a possible falling off of community construction in 1928; but this branch of the construction industry he showed is only half as important as the private construction branch in accounting for the total value of all production.

A third chart showed inverted interest rates on long-time securities plotted against the total volume of all construction, and from this it is established that contracts fall off about six months after interest rates increase. On this basis the plot showed conditions favorable for an increase in building in 1928. Bank transactions (check payments) with New York City omitted (because these do not represent business activity so much as speculation) plotted against construction contracts showed that the peaks and dips of both curves followed each other very closely. On this basis also there is every indication that 1928 will be a good year for building.

Mr. Holden said the total volume of construction in 1927 was approximately $6,800,000,000. For 1928 he prophesied a total of $7,000,000,000, or the biggest year ever. Other things than statistics to be considered in such a prediction, Mr. Holden said, were (1) the agricultural situation is much better than it has been; (2) the automobile business is getting better; (3) the electrical business was also growing rapidly. All these made for confidence, and confidence in business condition meant more building. He said he looked for a moderate improvement over 1927, but not a boom in building.

Symposium on Marine Operations

The greater part of one session was scheduled to be given to a symposium on marine operation, but the time had to be cut short on account of preparations for the banquet. The first paper, read by V. P. Ahearn, was on "Compensation Insurance in Marine Sand and Gravel Operations" by ***J. L. Richmond,*** Union Sand and Gravel Co., Huntington, W. Va.

It has recently developed that men employed in sand and gravel work on navigable waters are not covered by the usual state compensation insurance and they have been specifically exempt, for some parts of the work, by federal legislation covering benefits to sailors and others engaged in commerce and navigation. This leaves them in a bad position and some companies have met the situation by carrying "old-line" policies.

The paper went into the legal aspects of the case very thoroughly and gave resumes of some cases that have been before the courts. In one case a man hurt on a wharf collected damages under the state compensation act and afterward tried to collect under the admiralty act, but the court held that he had made his choice, and was estopped from collecting more than the one benefit.

Mr. Richmond thought that there should be special legislation providing for insurance to cover sand and gravel employes in a way that cannot now be done.

Marine Equipment

Following this was a paper by ***R. N. Coolidge,*** of the Dravo Contracting Co.,

Pittsburgh, Penn., "Design and Construction of Marine Sand and Gravel Units." He spoke of dredges, towboats and barges, but devoted the greater part of his time to the ladder dredge, which his company makes and which is so much used on the Ohio river.

The suction dredge did not particularly appeal to him as it could show no more than 8% efficiency, comparing the power used with the gravel dug and transported. This was based on an average of 9% solids in the pump discharge and a 50% efficiency for the pump. Dipper dredges he objected to on account of the "lost motion," but considered them as rivals of suction dredges in shallow water. The ladder dredge he said was the most efficient machine yet devised, but its expense, and the engineering problems involved in its construction, had kept it from more general use. He showed pictures of the No. 8 dredge of the Keystone Sand and Supply Co., Pittsburgh, (350 tons per hour) and the new dredge of the Ohio River Gravel Co. (500 tons per hour) to illustrate his points. Much of what followed in the description of these dredges had to do with screening and washing equipment.

Comparing power costs, he said that oil at 6 cents per gallon was about the same as coal at $10.40 per ton for boiler firing, although oil offered advantages in saving labor and time in coaling. Comparing Diesel and steam engines, he said a Diesel engine with oil at 6 cents per gallon compared with a good steam plant using coal at $5.00 per ton. Fuel cost on a good ladder dredge should be less than 1 cent per ton, with any good power plant.

For barges he thought much the best type to be the flush deck steel barge. The argument that a hopper barge was more stable was met by his observation that no flush deck barge had overturned except by careless handling or allowing the hull to get partly full of water. Steel barges of this type should last 12 to 15 years with proper care. The cheapest construction for decks, to resist the shocks of unloading with a bucket, had been found to be heavy steel plate.

The rake on a barge end affects the towing cost enormously. The parabolic type of rake takes 30% less power than flat rake ends. The tendency is to make larger barges, as this also cuts the towing cost, and the cost per ton of cargo as well. Copper bearing steel gives the longest life to barges.

In discussing towboats he compared the propellor and the stern wheel boat, but he seemed to think the best type was the stern wheel boat with two Diesel engines, of equal power, each driving an independent stern wheel. Such a boat can maneuver in a way that is impossible with older types. It can even move sidewise, and it has practically the same speed in backing as going ahead.

The paper was very well illustrated with slides and moving pictures.

J. R. Sinsibar of the Construction Materials Co., Chicago, followed, briefly describing the work of the large sea-going hopper type barges his company uses in dredging and transporting sand. It has boats just alike except that one has steam and the other Diesel power. The Diesel power boat cost $2700 a month less to run and runs more hours each month.

Recent Developments in the Concrete Masonry Industry

The paper on "Recent Developments in the Manufacture and Use of Concrete Masonry," by ***W. D. M. Allan*** of the Portland Cement Association, was read by E. F. Olson, president of the Consolidated Concrete Machinery Corp.

A survey of the concrete masonry units industry by the Portland Cement Association has just been completed and the summary shows that 4140 plants have reported an output equivalent to 350,531,000 8x8x16 block in 1927. These figures do not include production of cast stone, staves and similar products that might properly be included as masonry material. We believe that the survey included 85% of the active plants and about 90% of the total output for the year. This is the first comprehensive survey of the industry which has been undertaken, but it is hoped that it will be made each year and include all plants.

Trend to Smaller and Lighter Units

All masonry units, including block, brick and tile, were converted to 8x8x16 block for convenience, this being the most common size of unit, but the tendency in the industry for the last 10 years has been toward smaller and lighter products. On the West Coast where production is increasing rapidly very few of the 8x8x16 block are produced. The 3½x8x12, 5x8x12 and 6x8x12 tile are the most important units made. You doubtless can remember the 8x8x32 block that required two men to lay. A few years later the 8x8x24 supplanted the larger unit and was in turn replaced by the 8x8x16 block. While the later unit may have some disadvantages, it has popularized concrete masonry construction. However, the unit is heavier than the majority of brick masons care to lay and its size necessitates a great deal of cutting when used around openings and in skeleton construction.

The use of 5x8x12 tile is increasing more rapidly than any other product in the concrete masonry field. These tile weigh from 16 to 18 lb. and brick masons like to handle them because they are designed with handholes for convenience and the mortar beds are wide. These tile are particularly adaptable for back-up in bearing walls and in structural frames. The 5-in. height makes bonding with brick every six or seven courses very simple. With a small amount of cutting and a few brick any kind of a wall can be built economically with concrete tile.

Aggregate Requirements Increased Over 700% Since 1914

However, the majority of you are not directly connected with the concrete masonry business, you are interested primarily in effect of this development upon the sand and gravel business; 350,531,000 8x8x16 block require over 5,000,000 yd. of aggregate. Aggregate requirements for concrete masonry increased more than 700% since the war. The percentage of plants using bank-run, ungraded and dirty materials has decreased in almost the same proportion that the industry increased. Through the work of the Structural Materials Research Laboratories at Lewis Institute, and more recently, through the Portland Cement Association laboratory, we have been able to show products manufacturers the economy of using clean and properly graded materials. This has created a demand for aggregate from well equipped commercial plants.

While sand and gravel remains the most generally used aggregate in products plants, there has been, in several sections, a marked tendency toward the use of light weight aggregate such as cinders, "Haydite" and "Sinter." Where commercially available and of good quality these aggregates make a very satisfactory product and have made notable progress. Cost of materials usually determines the aggregate that will be used in a given market. This cost does not apply to aggregate alone but usually the combined cost of the cement and aggregate. A very cheap sand may be available in a given market and still not be economical for products plants if it is poorly graded and requires an excessive amount of cement to make a product of standard quality.

It appears to me that the most important service the sand and gravel industry can give the products industry is to study the needs of products manufacturers and the properties of the available aggregate and from this information furnish the products manufacturer with a graded material that will give the lowest material cost for a salable product of standard quality. This may require a special screening, but it will usually pay the producer located within economical shipping range of important plants.

Larger Plants the Rule

Rapid progress, in the industry, has not only been in total production but also in the number of large plants. Eight years ago there were few, if any, plants in the country producing as many as 1,000,000 block per year, but in 1927, 26 plants produced over 1,000,000 block per year each. Medium size plants are consolidating to form large economical and efficient plants. Small ones are being lost because they lack the ability to compete with their efficient neighbors. In the evolution of the products industry there has been a tendency on the part of manufacturers in passing from the back-yard stage to expend too much money in plant equipment. The pendulum has swung too far, and in the readjustment taking place at

present, the tendency is toward less fixed capital and the operation of the plant two or three shifts a day to supply the peak demand. Not infrequently in the past plants have been built and equipped to take care of peak production when operating one shift a day. Under these conditions the equipment was operated about 35% of the time, causing high fixed charges and overhead. Frequently plants producing 150,000 block per year had fixed capital investments amounting to $40,000 or $50,000 when the same output could have been obtained at a lower cost per unit with an investment not to exceed $20,000.

You may have products manufacturers among your cutsomers who are contemplating the rebuilding of their plants, or friends who plan on entering the business, who will come to you for advice or who would be glad to have your counsel. I would urge that you bring to their attention the importance of keeping fixed capital as low as consistent with economical manufacture of a quality product. This is not a plea for a return to the back-yard type of plant, for all of us know its evils, but it is a plea for a plant designed and operated for greatest profit, keeping in mind that the peak demand can best be supplied by operating two or three shifts per day rather than by installing equipment sufficient to take care of peak demand operating one shift a day and remaining idle from 40 to 60% of the time.

Research Applicable to Tamped Products

Since most of the work of the Structural Materials Research Laboratories was directed toward plastic concrete, the results were considered of little value to products manufacturers using the tamp method of production. By far the majority of products are made by the tamp method. A considerable number are cast, others are made in pressure machines and there are being developed in various sections of the country at present several vibrating machines which give promise of producing economically a quality product. Within the last few years much experimental work has been carried on by various Concrete Institute committees and the Portland Cement Association, and by progressive manufacturers. A review of their results shows that practically all of the laws developed by the Structural Materials Research Laboratories are applicable in tamped products. Sometimes the laws are not as positive as in plastic concrete, but they indicate definite tendencies and can be used by products manufacturers as a guide for their production methods.

In the case of the water-cement ratio law, application is not so direct as in plastic mixes where within the limitations of workability, the strength of the concrete is determined by the ratio of the volume of cement to the volume of water, other things kept constant. It has been generally considered that all mixes used in tamping machines, where products immediately after tamping are removed from the molds, were on the dry or unworkable side of the water-cement ratio strength curve. I believe that it was E. W. Dienhart who first discovered that it is possible to handle concrete for tamped products which is so wet that it falls on the wet side of the water-cement ratio curve with the result that strength may be reduced. It is the tamping that gives workability and plasticity to the mix which before tamping was considered too dry to come under the water-cement ratio law.

Aggregate Grading

A series of tests completed about two months ago, which will be reported soon by Committee P-1 of the American Concrete Institute, furnished positive proof of this fact for aggregates with fineness modulus of about 3.25. For coarser aggregates there was no falling off in strength to indicate that the concrete had been tamped into a plastic state. It has been customary to urge all tamped products manufacturers to add sufficient water to their materials to produce a distinct water web on the outside of the unit, this web being considered a definite measure of the quality of the products. With relatively fine aggregate this may be sufficient water to cause a falling off in the strength of concrete.

Demand for clean aggregates in all lines of concrete has been responsible for so much washing that in some cases a considerable amount of fine materials passing a 48-mesh screen have been washed from the sand. This has resulted in a harsh mix with ordinary amounts of cement and has caused excessive web and corner cracking. In other cases production has been slowed down considerably because of the extra care required to remove the product from the machine to the curing room. This condition has in many cases led to the use of crushed gravel, sand screenings or admixtures to supply the deficiency of fine material in the sand.

Stripping to obtain plaster sand has also resulted in a material containing insufficient fines to make a sticky concrete that will stand handling. Use of any fine material under a 48-mesh screen in excessive amounts results in a loss of strength and is very objectionable, but this does not preclude the use of a minimum of fines to give the stickiness necessary to prevent cracking and defective products. Whether 3, 4 or 5% of the material passes a 100-mesh screen depends upon the nature of the aggregate, the type of machine, method of handling and type of unit. Block made on the stripper type of machine with cells vertical seem less subject to web cracking from shortage of fines than the older type of face-down block with cells horizontal.

Roller conveyors for moving products from the machines to the curing rooms are satisfactory only when there is sufficient fine material to produce a "rubbery" concrete. Block 8 in. high are subject to more cracking than units 4 or 5 in. high if the aggregate is deficient in fines. Economy in products manufacture usually requires the use of the coarsest possible grading of aggregate consistent with the production of a salable product. This coarse grading should not be obtained at the expense of sufficient fines below 48-mesh scren to give workability and the stickiness required for ordinary handling.

Shrinkage Cracks

During the past two or three years the growth of the products industry has been so great that very frequently block, brick and tile have been delivered to the job when only a few days old. Usually they had sufficient strength to meet building code requirements, but under certain conditions serious cracking of the finished wall has resulted due to shrinkage of wet units.

Concrete products insufficiently cured, and wet when laid, shrink as they dry. In foundation work the drying is very slow and the units gain in strength more than enough to resist the shrinkage stresses developed. In above ground construction, however, the drying is usually more rapid and if the units are laid in a rich cement mortar the bond between them and the mortar is very strong. Tests show that the bond between concrete masonry and cement mortar is so strong that a masonry pier built of 1500 lb. concrete brick develops about the same strength as a pier built of 2500 lb. clay brick laid in the same mortar. Because of this bond the shrinkage stresses in each unit are transmitted to the next unit and so on until the stress is sufficient to crack the wall. The bond in other types of masonry is weaker and the shrinkage cracks develop in the mortar joints instead of transmitting the stresses to adjoining units.

The remedy is clear and many manufacturers have already equipped their plants to permit products to dry out thoroughly after curing. In some cases a hot blast of air is forced through the curing rooms after sufficient moist curing to develop the required strength. This method is not generally recommended and a much better procedure is to store the block under cover to dry after they have been wet cured to develop the strength and density required. The only danger to be avoided is that of allowing the products to dry out before they have received wet curing. We have stressed the importance of damp curing to develop the desired properties in concrete for so long that it, this requirement for drying, may be misinterpreted and confused with the curing process. The drying should not take place until after the wet curing has been provided.

Promotion Campaign Under Way

You are probably interested in knowing what the Portland Cement Association plans for 1928 to help increase the use of concrete masonry. Three major uses of the product are housing, industrial building and curtain and partition walls in skeleton construction. Practically all of our work as outlined for the next three years will be devoted to more

aggressive merchandising. The foundation work for a merchandising campaign has been carefully laid during the past seven or eight years. Immediately after the war we started a campaign to standardize the quality. Specifications were developed, building codes revised, regular testing became common practice.

We soon found that the cost of manufacture had increased considerably because of improved and standardized quality. Our next campaign was to educate the industry in ways to cut the cost of manufacture without sacrificing quality. This required that schools be conducted in important centers to show how the proper selection of aggregates, mixing, tamping and curing could be used to produce units at minimum cost. Efficient plant layouts were prepared and given to manufacturers interested in building new or rebuilding old plants. The result of this seven years work was a quality product economically manufactured.

The remaining requirement is to increase the volume and this must be obtained through better and more aggressive sales methods, hitherto practically unknown to the industry. An industry that is valued at $70,000,000 a year and that has grown 700% since the war without much sales effort should be able to greatly increase its output through the adoption of intelligent sales methods.

Sales schools will be held during the coming year in all important masonry centers to show how manufacturers can increase sales. Advertising copy will be furnished. In some cases our own advertising will be of assistance and products men will be shown how and encouraged to cash in on it. We will urge manufacturers either as individuals or as local associations to employ salesmen to fight for every job. We will assist with the training of salesmen. If desired they can be sent to our headquarters in Chicago and given complete information regarding the product and how to present the merits of concrete masonry to architects, contractors and builders.

A series of 18 house plans are being prepared for us by the Architects' Small House Service Bureau. Each of these will be run in at least 56 newspapers during the year. Manufacturers will be advised in advance of the date when each plan will appear in their local paners and they will be furnished with appropriate copy to tie into the news story.

Light-weight tile manufacturers will be encouraged through special publications and fire tests so that a larger volume of their material can be sold for skeleton frame construction. One tile manufacturer in Los Angeles sold 900,000 tile for school house construction alone during the past year.

An inspection service conducted by the Underwriters' Laboratories on concrete block, and we hope in the near future on thin wall tile, will do much to build up the highest regard for concrete masonry in the minds of architects and builders.

The only thing remaining will be to improve the manufacturing and sales methods to cut cost of production and put this product on a favorable competitive basis. This is a problem that each local manufacturer will have to solve for himself. In its solution the sand and gravel producer will be an important factor.

Necessarily any discussion of this broad subject must be covered by hitting the high spots and this is all that I have attempted. I may have suggested points upon which you desire further information. If so, I will be glad to discuss any of them now, if your chairman desires, or I will meet with you after this session. Sand and gravel producers can render a real service to the products industry by becoming thoroughly familiar with its problems. Any assistance you can render the concrete products manufacturer will help increase the present 5,000,000 cu. yd. of aggregate to 10,000,000 cu. yd., which is one of our goals for 1928.

If we can help you at any time or if any of the products manufacturers on your list of customers are in need of help, please feel free to get in touch with us and we are anxious to be of every assistance possible to the industry.

"Profitless Prosperity"

St. Elmo Lewis, of Detroit, a publicity expert, talked on "Profitless Prosperity"; he placed the blame for the profitless condition on the misunderstanding of the modern tendencies of business.

The sand and gravel industry with its $400,000,000 investment, he said, is today confronted by the same condition that other industries have met, falling prices which are to be *stabilized on a basis of the cost of efficient operation.* Efficient organization can meet the declining price and still make money.

Size is important only in point of giving effective service, the small institution may be as efficiently organized as the big one.

Men who headed great industries, he said, were classified by their attitude toward the industry as a whole. The big man never shut the door on ideas. He was not concerned about what had happened, but what was going to happen; not concerned so much about where he had been as where he was going.

The so-so man is the man who wants to let well enough alone. He "saves" the cost of research and sneers at a cost system as a mere ornament. His one hope is some day to be able to fix a price that will enable him to make a heavy profit, regardless of costs or production conditions.

The last man in the line is the one who is a real danger to any industry, the man who thinks, "if Jones can do it I can" without finding out how Jones does it. He sells sub-standard material and he always cuts the price.

The way for successful concerns to eliminate this disturbing factor is to put the business on the most economical basis possible, to pass on some of the saving to the consumer and to show the consumer the difference between standard and sub-standard material.

Research can go a long way toward establishing a business. He spoke of the comeback of the victrola makers as an example. There was no discussion of business conditions by office men and there were no new sales methods that brought this about. There was only the work of a few specialists in a laboratory developing the orthophonic victrola.

It was research that made the market for portland cement. In 1925 cement displaced 600,000 tons of steel in construction. Steel was in the hands of production men who thought they made such a basic commodity that people would have to come to them to buy it.

Now they see the necessity of study and research and over 98% of the structural steel men are in the newly formed institute to study the uses of steel. Among other things they are studying building codes, many of which have not been revised in 30 years, and the old codes work to their disadvantage.

Research is the price of stability in business as well as the price of progress.

Producers should study their markets. They think because they have been supplying a market they know all about it. But people do not know familiar things. How many of us know the size of the shoe we wear, or whether the keyhole in the front door is above or below the knob?

We ought to know our competitor—really know whether he can produce at a lower cost and why, whether his sales method is better than ours and how much better and what he is depending on to increase his business.

And we should remember that the *real* customer in the building material business is the owner of the building. We are apt to think of the architects, engineers and contractors as the men we should sell. We let them use us, but instead we should use them. Every stable business stands in with the ultimate consumer and uses the intermediary.

We cut prices because we take the word of some unscrupulous buyer, without really knowing whether what he sells us is true or not. Modern business has no room for "David Harums," sharp and unscrupulous traders.

A buyer will say, "Bill, you and I have been good friends for 10 years, and I'd like to give you this order. Sharpen your pencil and see if you can't figure to meet this figure?" So Bill sharpens his pencil and finally takes the order on a basis of swapping dollars, and then goes back to his office and tries to figure out some way of beating his old friend by giving a poorer quality of material or working in something for which he can make an extra charge. This is trading, small town stuff. It has no place in modern business, for it lowers the price to where it can only be met by depreciating the quality.

Research is the answer to many sales problems. The buyer is working toward a cer-

tain state of mind. Research, both of the product and the market, should be able to anticipate the decision he is making and should have the company ready to meet the buyer by the time he makes up his mind. Selling, the right kind of selling, is to be the real problem of the next decade.

Cleaning and Repairing Cars

A paper on "Cleaning and Repairing Cars Placed for Loading of Sand and Gravel at Plants" was read by ***J. C. Buckbee,*** president of the Northern Gravel Co., Chicago, Ill. A part of this paper follows:

"The records of the American Railway Association indicate approximately 2,800,000 cars of sand and gravel and crushed stone were handled by the railroads of the United States during the past year.

"A carefully kept record of my own company, covering close to 2000 cars, indicates the labor cost of cleaning and patching the average gondola car to be 56 cents where labor costs 45 cents per hour. If this cost be typical of our industry, it is evident we spent, for cleaning and repairing cars during the past year, over $1,500,000. Surely such a sum erits the attention of the industry.

"Let us take the case of a concern shipping 5000 cars annually. The expense of cleaning and repairing gondola cars would cost this producer, at the above rate, $2800 annually or, considering his season to be eight months, $350 a month.

"The Bureau of Mines of the United States Department of Commerce states that the average price of sand and gravel f.o.b. cars at the plant in 1926 was 61 cents per ton. This is too high a figure for our section, where the average price is probably nearer 40 cents per ton.

"Taking such a figure as a base and 55 tons per car as an average load, the billing price of the load is $22, and it is obvious, that the cost of cleaning and repairing cars is over 2½% of the sales price."

Mr. Buckbee said that at his company's plant, located 35 miles north of Milwaukee, excellent car service was given, but cars were received belonging to carriers from all parts of the United States. Most of these are drop bottom gondolas and the types are so many that "nothing is standard but the couplers and the wheel gage." It was his opinion that the carriers might profitably settle on some standardized form of gondola car which would be also to the shipper's advantage.

Cars are cleaned and the cracks in the bottom are stopped with a little pea gravel. Old lumber is used for repairing cars where this is needed, and it is cut in short pieces by a power saw.

Speaking of the "general service, drop bottom gondola," he said:

"These cars seem to suffer in service for more than the solid body car and reach us in all sorts of condition. Practically none of these drop bottom cars appear to have doors that close tight, and not only do some of the doors of the cars have cracks around the doors but the doors themselves are lower than the body of the car by from 1 to 2 in., which leaves pockets in which foreign material such as coal, cinders, tan bark, etc., from the previous loading remains and makes the cars very difficult to clean.

"In many of the types several of the doors in the car will refuse to drop when the latching device is released for cleaning, and in many of the cars we have to use wedges or slugs in the door latching mechanism on closing the doors to be sure that the door will not let go in transit and drop the load.

"The carrier should be interested more in this matter of dropping the load than the shipper because it not only means claims for loss of material, which must be paid, but derailments of an entire train have been caused by one or more doors on a gondola car dropping while the train was in motion.

"The conditions of the cars placed for loading at our plant I presume are about the same as experienced by all of the members of our industry. However, I believe the description of the conditions is sufficient to proceed to a consideration of what may be done to reduce the expense, both for ourselves and for the carrier.

"We have, therefore, suggested to our railway that a survey of their business be made to determine if as many drop bottom cars are actually needed by their customers as the number kept in service by the carriers would seem to indicate.

"It is our conviction that the drop bottom gondola idea has been carried way beyond any point of necessity and that the carriers could profit handsomely by rebuilding most of their older and less efficient drop bottoms into solid body cars.

"We have observed that the majority of our customers use clamshell buckets and cranes for unloading washed sand and gravel, because with such cranes they are able to put the material into hoppers or trucks or into stockpiles and with the same crane reload from stockpiles into hoppers or trucks.

"Clamshell buckets are necessarily hard on cars, even when handled by experienced operators. We therefore suggested to our railway that in repairing old cars or building new cars they install a wearing bottom of 3-in. plank laid lengthwise of the car over the 2-in. plank that is ordinarily laid crosswise of the sills of the car.

"Most clamshell buckets close lengthwise of the car and tend to slide working lengthwise of the plank rather than to bite in and tear up the plank, as is the case when working on a bottom of the ordinary type of car where the planks lay crosswise of the car across the sills.

"In our territory the use of clamshell buckets and cranes for unloading not only sand and gravel and crushed stone, but coal, seems to be steadily increasing, presumably because of the ability to stockpile material as mentioned above and I presume the experience in most parts of the country is similar to our own judging by the great number of locomotive cranes we see on every hand."

Inspection and Tests of Road Building Material

In discussing the testing of gravel, Prof. ***W. J. Emmons,*** of the Michigan highway department, said that the material which gave the most difficulty was that which contained pebbles of soft stone. Repeated tests had proved that this stone does not affect seriously the tensile and compressive strength of concrete, as shown by laboratory tests. But it does not stand the wear that pavements must receive. It also absorbs water, and the absorption causes it to swell and break the concrete. For this reason gravel containing such soft stone in any large quantity is unfit for concrete paving purposes.

Present Michigan highway specifications say that not over 3% of the shale, sandstone and other soft and "non durable" particles may be admitted in concrete paving aggregate. The test for the soft and "non durable" stone found in gravel is to lay the pebble on an anvil and tap lightly with a hammer. The resulting pieces may usually be crushed by the pressure of the fingers. This is a quite unscientific test, but it is one which trained inspectors can apply convincingly. Experience is necessary to use it in such a way as to be fair to the sample.

It is the policy of the highway department to place inspectors at plants wherever the quantity shipped justifies the expense of about $350 per month. Where less than 10 cars are shipped daily, plant inspection costs too much.

The record of an inspector is not judged by the number of cars he rejects. He does his best work in anticipating trouble and preventing rejections. He is supposed at all times to co-operate with the producers but not to interfere with the plant or to give advice unless this is requested of him.

Sampling gravel is, and always will be, a difficult matter on account of seggregation. Not only cars, but different parts of the same car may differ. In sampling a car an inspector takes a shovelful from seven different places which he cores and quarters down. Where cars are running uniform in contents, he is allowed to combine three cars in one sample.

With so much inspection to be done it is impossible to sample every car, and much of the material has to be passed with "eye-inspection."

Im going into new territory a survey of the aggregate resources is made, and producers are generally found willing to co-operate. But producers ought to know their plants and their deposits better. In the larger plants a man should be definitely assigned to do testing and to control the quality of the material. The producer would be able to foresee trouble if the deposit was examined and tested in advance of excavation. A man appointed to this testing work could take a short course, in the winter months, at the state highway laboratory and the expense for testing equipment would hardly exceed $100.

Complete co-operation between producers and the highway department can only be had by complete understanding, and such

training would aid to bring about such understanding.

Reports of Committees and Election of Officers

The principal committee report presented was that of the Depreciation Committee of which George A. Rogers of the Union Rock Co., Los Angeles, Calif., is chairman, Mr. Rogers was unable to be present and his report was read by Executive-Secretary Ahearn. It reads in part:

A schedule was prepared by a special committee of the Southern Rock Products Association and submitted to the national organization from consideration by producers in other sections of the country. The replies from these operators indicated a remarkable agreement with the experience of the California members. Excepting for some unusual conditions, this should be expected as plants and operations are much the same in this respect throughout the industry. The general contractors have made good headway in their efforts to establish a similar schedule and have derived real benefit from the recognition of actual depreciation costs.

Your committee recommends that the following schedule be submitted once more to the members for suggestions regarding items added since the last report and that the replies be used to complete a final list which should be adopted as standard and given the widest publicity so the rates agreed upon will be generally used to determine taxable value of sand, rock and gravel plants. It will be noted that several items of marine equipment have been added as requested by some members.

STANDARD DEPRECIATION SCHEDULE

Equipment	Economical Life
Auto crane, gas	5 years
Auto crane, steam	6 years
Auto truck	3 years
Barges, wooden	8 years
Barges, steel	12 years
Batchers	2 years
Bins, wooden	8 years
Boiler mountings	10 years
Buckets, clamshell	4 years
Buildings	10 years
Cars, quarry	4 years
Cars, wood dump	4 years
Cranes, caterpillar	4 years
Cranes, gantry	6 years
Cranes, locomotive	6 years
Crushers, single roll	5 years
Crushers, jaw	8 years
Crushers, gyratory	8 years
Dragline, gasoline	5 years
Dragline, excavators	5 years
Drag scrapers	1 year
Dredges, clamshell	7 years
Dredges, dipper	6 years
Dredges, hydraulic	10 years
Electric power equipment	6 years
Engines, gasoline	4 years
Engines, oil	5 years
Engines, steam	10 years
Hoists	10 years
Launches, gasoline	6 years
Loaders	3 years
Locomotives, industrial, steam	8 years
Locomotives, gas	5 years
Locomotives, electric	8 years
Motors	6 years
Pipe, galvanized	3 years
Pontoons	8 years
Pump, centrifugal	5 years
Rails	5 years
Rock drills	2 years
Scales	10 years
Shafting	10 years
Shovels, steam	5 years
Shovels, gas	4 years
Shovels, electric	6 years
Shovels, Diesel, oil	5 years
Steamers, paddle wheel	16 years
Tugs, screw propelled	16 years

The following items of equipment are so short-lived and uncertain that they are recommended for listing as operating expense; belt feeders; belting, conveyor belts; bin gates; buckets (drag-line); cables (wire); chains (steam shovel); chains (drive); chutes; chute liners; dippers (steam shovel); dipper teeth; elevator buckets; grizzlies; pulleys; screens; screens (shaking); sprockets; switches; ties; railroad spikes and bolts.

The resultant of all depreciation is the average sand, crushed rock and gravel plant is, as nearly as we can determine, 15%, representing a useful life of seven years for the original investment.

We have considered depreciation as the loss of original usefulness beyond the ability of repairs to correct and have allowed for the normal credit of scrap value in establishing the numbers of years of economical life. Inasmuch as obsolescence may retire a piece of equipment even before it has reached the service age here allowed, these estimates are considered quite conservative. Recent experience of producers who have found their entire plants practically obsolete because of completion of highway programs or shrinkage of anticipated market demands would well justify the increase of our total plant rate to 20%. Where a flat rate for the entire plant may be used, we feel that the commissioner of Internal Revenue should readily recognize the reasonableness of our rate of 15%.

Committee on Standard Sizes

The committee on standard sizes of sand and gravel, of which S. Stepanian is chairman, sent in a report that was read by Stanton Walker. This committee has had two meetings since the last convention and has settled upon the tentative specifications which will be found in last year's report. It is the intention to report these to the board of directors which will refer them later to the membership.

Mr. Walker said he wished the members to understand that these specifications do not represent ideal products. They have been drawn with wide limits to admit materials from many parts of the country and to set up limitations which would not be passed. Local associations and specification making bodies should modify them to adapt them to local conditions.

The report of the committee on engineering problems was passed over, and the committee on washed gravel ballast merely reported that it had had no opportunity to meet since the midsummer meeting.

Banquet and Entertainment

The banquet and entertainment prepared under the supervision of Charles H. Ray, general chairman of the convention committee, was something to go down in the history of National Sand and Gravel Association conventions. For originality and pure enjoyment it is hard to conceive how it could be beaten. "A Night in Paris" was all that its title implied. The manufacturers' division of the association contributed generously to the expense, but to Charles Ray, whose mind conceived it and whose artistic talent exerted it, will ever go the chief credit for this memorial occasion.

Officers for 1928

Almost the last work of the convention before adjourning was the election of officers for the ensuing year. The nominating committee brought in its report which was adopted by a unanimous vote. Those elected


THE
SANDY LINE
The Shore (Sure) Line
Str. N. S. G. A.
Convention Excursion
Fast 3-Day Schedule
1928
The value of this ticket is the exchange of practical experience, new ideas, and the complete exhibit of improved machinery of increased capacity and efficiency.
Guest—The Sky
Stopover for
"A Night in Paris"
with the Sea Hawks
Form 7-1928
Keep this Stub as Your Receipt 1073

THE SANDY LINE
MENU
Coupe aux Fruits, Carmen
Creme de Petit Pois, St. Germain
Coeurs de Celeri Olives Vertes et Noires
Poitrine de Volaille Sante au beurre
Pommes de Terre Parisienne
Haricots Verts, Maitre d'Hotel
Coeur de Laitue
Fromage de Roquefort et Mil Ille Sauce
Biscuit Tortoni Praline
Friandises
Demi Tasse
6

THE SANDY LINE
Jules Klein Orchestras and Attractions
present
"A NIGHT IN PARIS"
(A Sparkling Revue with a Cast of Twenty-eight Artists)
Produced Exclusively for the National Sand and Gravel Association Convention
PROGRAM
OVERTURE ..... Medley
Jules Klein's Sal Tabarin Orchestra
This entertainment is provided with the compliments of the Manufacturers Division of the National Sand and Gravel Association
5

THE SANDY LINE
GRAND OPENING
Scene 1
1. Aboard the Cook's Tour Special "SANDY SAM STEAMER N.S.G.A."
Grand Ensemble Opening, Entire Cast.
Captain Jolly of the Steamer N.S.G.A.—Johnnie O'Pray (The Irish Caruso)
Cook's Tour Agent ..... George Mitchell
Dancing Girls—Grace Rivard, Ann Patterson, Babe Norris, Doris Oliver, Sylvia Markie, Dorothy Darling, Ruth Verne, Lorita Gomo, Queenie Rose, Beve Daines.
Passengers, Sailors, etc.
Music—Special Songs:
"We're on our way to gay Paree."
"You bet, boys, let's roll."
4

THE SANDY LINE
Scene 2
A NIGHT CLUB IN PARIS
2. Sandy Sam, the personality waiter ..... Jackie Ryan
3. Fatima and Omar—Apache dancers ..... The Griffins
4. The Prize Winning Soubrette in "You've Got to Know How" ..... Elsie Gilbert
5. The Two Black "Jacks"—Fun and harmony ..... Mif and Mos
6. The N.S.G.A. FASHION PARADE featuring "Miss Detroit," Ruth Mae Fowler, supported by chorus and principals.
7. Mme. De Vay Ramsey, prima donna from "Blossom Time Co."
8. Piano—"Log"—Tons of song and 20 pounds of piano—Ted Merry.
9. Dancers Supreme—Elizabeth Swanson and Frankie Alexander.
Flashes, Songs and Steps—"That High Stepping Queen of Syncopation."
10. The Irish Caruso—Vodvil's Clever Songster ..... Johnnie O'Pray
11. Two Girls and a Piano ..... The Sarvasy Sisters (Imported from the Great White Way in "A Night in a Cabaret.")
12. Toe Dance and Whirlwind Specialty ..... Mignon Rene (Featured with the Imperial Russian Ballet.)
13. Prima Donna ..... Mme. De Vay Ramsey
14. Snowtime in Gay Paree, Entire Cast and Chorus.
15. Grand Finale: A gorgeous singing and dancing creation, chorus specialty, whirlwind dancers, beautifully costumed, entire cast.
3

THE SANDY LINE
DANCE PROGRAM
Music by
JULES KLEIN'S SEA HAWKS
(11 Masters of Syncopation)
Entertainment: Cabaret Numbers, Specialties, etc. Scheduled Between Dances
2

were: R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Iowa, president; F. D. Coppock, Greenville Gravel Corp., Greenville Ohio, vice-president; Earl Zimmerman, Ohio Gravel Ballast Co., Cincinnati, Ohio, treasurer. The executive committee consists of the above and H. V. Owens, Booneville Sand Co., Utica, N. Y.; R. J. Potts, Pottsmore Gravel Co., Waco, Texas; H. S. Davison, J. K. Davison and Bro., Pittsburgh, Penn., and Frank W. Peck, Munice Sand Co., Kansas City, Mo.

The directors at large, elected by the board, are H. V. Owens, F. W. Peck and John D. Roquemore, Roquemore Gravel Carp., Montgomery, Ala.

Advocate a Laboratory

President Haddow and ***Alex W. Dann*** of the Keystone Sand and Supply Co. both made talks advocating the establishment of a laboratory, which is one of the matters that is to be decided by the executive committee in the coming year. Mr. Dann's talk was especially strong, for he pointed out that while producers claim to know a lot about their products, and ask their customers trustingly to accept what they say about it, they really know only what has been told them and the information has come from outside sources altogether. He mentioned a few uses of gravel that needed rather immediate investigation.

Beyond the investigation for which a laboratory is needed, he thought there was the still wider field of sales and market analysis research, and still beyond that is research tending to conservation of deposits.

Resolutions

Resolutions were adopted commending the administration of Hugh Haddow, Jr., as president of the association, and the members showed their appreciation of his work by rising and applauding.

Similar enthusiasm greeted the resolution thanking Charles Ray and his associates for their excellent work on the convention committee, in making this convention the best in the history of the association.

Machinery and Equipment Exhibit at the Convention

FIFTY-FOUR manufacturers of sand and gravel equipment displayed their products in booths especially arranged for them at the Book-Cadillac hotel. This exhibit, only the second to be presented at a national convention of sand and gravel producers, exceeded last year's display and was attended with considerable interest by the convention. A list of exhibitors and brief description of their exhibits follows:

The Allen Cone Co., New York, N. Y. Displayed a model of their sand cone, also catalogs and reprints from ROCK PRODUCTS. E. S. Tompkins represented the company.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Photographs of installations of their Tex-rope drives, crushers, roller bearing motors, pumps and hydraulic equipment in sand and gravel plants along with catalogs made up their display. This company was represented by C. M. Davis, H. Migneault, A. Goldberg and J. S. Bond.

American Manganese Steel Co., Chicago Heights, Ill. In the two booths occupied by this company the following products were displayed: Model of a 12-in. Amsco pump, model of a new manganese steel apron feeder, managanese steel chain and dipper teeth and other manganese steel products. A fine collection of photographs showing pumps, cutter heads, sheaves and dredge installations were also on display. Bradley Carr and Perry Nagle represented this company.

Bakstad Crusher & Equipment Corp., Chicago, Ill., exhibited a model of their 3-jaw crusher, also construction photographs of their crusher. J. Bakstad was in the booth.

W. H. K. Bennett Co., Chicago, Ill. A model 12-in. Diamond pump and cutter made up the principal display in this booth. Manganese steel dipper teeth, chain, jaw plates and concaves were also displayed along with a dredge sleeve and photographs showing installations of this company's products in sand and gravel plants. W. H. K. Bennett and V. W. Anderson of the Pettibone Mulliken Co. had charge of this exhibit.

Blaw-Knox Co., Pittsburgh, Penn. Some large photographs showing batchers, buckets and inundation plants along with small models of their "Dreadnaught" bucket and circular batchers, also an all-steel turntable occupied their two booths. O. Lamp represented the company.

Brookville Locomotive Co., Brookville, Penn. Displayed photographs and recent bulletins in their booth which was in charge of A. B. Lampe.

Bucyrus-Erie Co., South Milwaukee, Wis. A very interesting illuminated double panel containing 122 photographs of this company's shovels, draglines, and dredges in operation made up the display. F. O. Wyse, P. M. Richards and H. Titus represented the company.

Cement, Mill and Quarry, Chicago, Ill. Displayed copies of current issues of their magazine. Represented by R. A. Goodwin.

Chain Belt Co., Milwaukee, Wis. This company, along with their affiliated company, the Stearns Conveyor Co., exhibited their new Rex-Stearns chilled face cast iron idler. It has anti-friction bearings and pressure lubrication. Panels showing samples of chain and buckets also photographs showing installations of their products were displayed. E. D. Stearns and Russell Davis represented this exhibitor.

The Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio. This booth was well filled with samples of rubber conveyor belting, sand suction hose and dredging sleeves and rubber chute linings. A fine array of installation photographs and literature were displayed. The company's representatives in attendance were L. P. Darnell, K. E. Kersten, C. M. Young, S. D. Baldwin and J. R. Reed.

Cross Engineering Co., Carbondale, Penn. A display of various kinds of perforated metal and buckets were exhibited. W. S. Nicol represented the company.

The Dorr Co., New York, N. Y. Working models of the Dorrco sand washer and the Dorr Bowl Classifier were exhibited. Represented by W. B. Geary.

The Dravo Contracting Co., Pittsburgh, Penn. Photographs and blue prints of standard and special boats, barges and sand and gravel plants designed and built by the exhibitor were displayed. Represented by R. N. Coolidge, V. B. Edwards and A. C. Leigh.

Eagle Iron Works, Des Moines, Ia. Exhibited a model sand and gravel washer, also photographs of the Swintek suction screen nozzle ladder. Represented by T. Aulmann and C. B. Laird.

Easton Car and Construction Co., Easton, Penn. Displayed models of their Won-Way and Phoenix cars. Also moving pictures showing their cars in use in rock products plants. Represented by G. D. Fraunfelder.

Fairbanks, Morse and Co., Chicago, Ill. Panels showing photographs of their pumps, ball bearing motors, Diesel engines, dredge equipment and scales made up this exhibit. Represented by T. M. Robie and E. D. Bader.

Farrell-Cheek Steel Foundry Co., Sandusky, Ohio. Ehibited sprockets, dipper teeth, chain, buckets and sheaves manufactured from "Farrell's 85." Represented by M. M. Ritter and W. C. Scott.

The Fate-Root-Heath Co., Plymouth, Ohio. An attractive panel display showing locomotives in use in sand and gravel plants and of their new Diesel locomotive made up this exhibit. Represented by E. W. Heath.

General Electric Co., Schnectady, N. Y. Panels showing photos of G-E motorized power in the sand and gravel industry made up an attractive display. A 10-hp. induction motor was also displayed. Represented by J. T. Appleton and T. C. Reeves.

Hardinge Co., York, Penn. Displayed a scene-in-action picture of a Hardinge conical mill with a superfine air classifier. Also photos and literature. Represented by G. F. Metz, F. E. Finch and A. H. Bamman.

Harnischfeger Sales Corp., Milwaukee, Wis. Moving pictures and a multiplex display rack of photographs showing their product made up this exhibit. Represented by H. E. Mensch and N. P. Harrai.

The Hayward Co., New York, N. Y. Exhibited a working model of a clam shell bucket, the operation of which was demonstrated through the use of a working model of a hoist and derrick. Also panels illustrating their clam shell, new drag line and orange peel buckets. Represented by H. M. Davison and H. C. Ryder.

The Heil Co., Milwaukee, Wis. A novel motor truck with a working model hoist was displayed. Also a cross sectional full size aluminum hoist was displayed. Represented by A. O. Hyner and Roy L. Dercksmeir.

Hendrick Manufacturing Co., Carbondale, Penn. Exhibited perforated rotary and flat screens, plates and grating. Also an array of literature. Represented by B. Shoten and B. G. Dann.

C. W. Hunt Co., Inc., Staten Island, N. Y. Exhibited their new model piano wire Mitchell vibrating screen. Represented by P. S. Moore and St. Clair Smith.

Industrial Brownhoist Corp., Cleveland, Ohio. A good display of photographs of cranes in sand and gravel plants. Also ball bearing conveyor idlers. Represented by B. W. Beyer and P. A. Henault.

The Jeffrey Manufacturing Co., Columbus, Ohio. A panel board exhibiting chain, buckets and sprockets was displayed. Also a working model of their new "X-Track-Tor" car unloader and moving pictures of same and their anti-friction idlers. Represented by J. R. Warren and G. D. Francisco.

Koppel Industrial Car and Equipment Co., Koppel, Penn. A complete display of photos illustrating cars and track equipment. Represented by H. Redman, C. Stewart and J. Dale.

A. Leschen and Sons Rope Co., St. Louis, Mo. Displayed samples of red strand wire rope, sizes ¼- to 2-in. Represented by E. E. Hickok and A. Walters.

Link-Belt Co., Chicago, Ill. Exhibited a full size vibrating screen. Also a working model sand and gravel screening plant with belt conveyors, bins, screens, etc. In addition anti-friction conveyor idlers, also photographs. Represented by C. S. Huntington, A. R. Schifflin, H. L. Strube and G. A. Paige.

Manganese Steel Forge Co., Philadelphia, Penn. Displayed all sizes of "Rol-man" double lock mesh woven manganese steel screens. Also chute plates and forged manganese steel pins and bushings. Represented by L. W. Jones, W. H. Potter and J. S. Morrison.

The Marion Steam Shovel Co., Marion, Ohio. Showed panels of photographs of all types of shovels, cranes and draglines used in sand and gravel industry. A full line of catalogs. This company conducted a "Lucky Number Button" contest in which producers were given a handsome prize if they succeeded in finding another producer who had the same number on his button. Represented by H. T. Gracely, L. C. Mosley, Grant Davis, J. C. French and C. M. Howser.

Mead-Morrison Manufacturing Co., Boston, Mass. Exhibited a capstan and drum type car puller, also grab bucket and literature and photographs. Represented by P. T. Redfern.

Morris Machine Works, Baldwinsville, N. Y. Showed a model centrifugal pump and full size blue prints of an 8-in. and 10-in. electric dredge. Also photographs of dredge installations and bulletins on sand and gravel pumps and hydraulic dredge machinery. Represented by V. J. Milkowski.

The New Jersey Wire Cloth Co., Trenton, N. J. Displayed screen cloth from 30-mesh to 3-in. size, also booklets and literature. Represented by C. E. Emerson and H. W. Ogden.

Niagara Concrete Mixer Co., Buffalo, N. Y. This company occupied four booths to display two double deck and a triple deck vibrating screens. Also literature, photographs and blue prints of installations. Represented by W. L. Wettlaufer, R. B. Ross, E. L. Wettlaufer.

The Osgood Co., Marion, Ohio. Showed six panels showing full line, also catalogs and other literature. Represented by E. C. Smith and H. H. Siff.

The Owen Bucket Co., Cleveland, Ohio. Displayed literature and model buckets. Represented by H. W. Botten and E. W. Botten.

Pit and Quarry, Chicago, Ill. Copies of current issue. Represented by H. W. Munday.

Roberts and Schaefer Co., Chicago, Ill. Exhibited a 3-ft. model of the "Arms" horizontal vibrating screen. Represented by P. Y. Dooley and R. W. Arms.

ROCK PRODUCTS, Chicago, Ill. Displayed the Annual Review and Directory Number for 1927. Also reprints of the Editorial Comment on "The Absorption of Freight Rates." Represented by N. C. Rockwood, Edmund Shaw, W. A. Wilson and Ralph C. Sullivan.

Sauerman Bros., Chicago, Ill. An interesting display of a model plant for stocking and reclaiming of outside storage with a "Crescent" scraper, steel head post, fairlead block and elevated bridle shifting device. Also moving pictures of their equipment in operation. Represented by G. H. Tompkins and W. F. Bartholomae.

Smith Engineering Works, Milwaukee, Wis. Showed models of the Telsmith sand settling tank, Ajax sand-gravel washer and Telsmith sand re-washer. Also a full line of literature. Represented by V. H. Jones, D. D. Baines, E. Kraig.

Stephens-Adamson Mfg. Co., Aurora, Ill. Displayed a working model live roll grizzly and new equipment for scalping and screening. A complete line of belt conveyor carriers, including ball and roller bearing types with high pressure lubrication. Also a working model of the "J.F.S." variable speed transformer, which takes power from high speed motors and delivers same at varying speeds controllable at will. Represented by D. B. Piersen, C. H. Adamson, E. P. Escher, Wm. De Muth.

Symons Brothers Co., Chicago, Ill. Displayed several photographs of Symons disc and cone crushers. Represented by L. D. Hudson, J. M. Thistlewaite, A. C. Colby.

Taylor-Wharton Iron and Steel Co., High Bridge, N. J. Exhibited a "Tisco" solid manganese steel dipper. Also "Tisco" chain, sprockets, dipper teeth, dredge chain and manganese steel forgings of various kinds. Represented by J. A. Trainor.

The Thew Shovel Co., Lorain, Ohio. Showed a very unique electrical display of the "Center Drive" of the Thew's shovels and cranes. Also a panel of installation photographs of the "Lorain 75A" shovels and cranes. Represented by M. B. Garber, J. P. Van Vielt, H. W. Miller.

The W. S. Tyler Co., Cleveland, Ohio. Displayed a full size Hum-mer electric vibrating screen. Also samples of wire cloth and screen. Represented by A. E. Reed, W. D. Pringle.

Universal Crusher Co., Cedar Rapids, Iowa. A steel working model ¼ size crusher for gravel was exhibited. Also photographs of their complete line of crushers and screens. Represented by L. W. Dunlap and E. A. Velde.

Vulcan Iron Works, Wilkes-Barre, Penn. An excellent display of photographs and literature of their steam and gas locomotives. Represented by Harold Olsen.

The F. M. Welch Engineering Service, Greenville, Ohio. Showed full-size blue-prints of a sand and gravel plant designed and built by them. Represented by F. M. Welch.

Western Wheel Scraper Co., Aurora, Ill. Moving pictures of their cars in operation were shown. Also photographs of their various types of cars.

G. H. Williams Co., Erie, Penn. Exhibited a working model of their double arch dragline bucket. Also models of their grab buckets. Represented by W. C. Swalley.

Convention Registration

ABOUT 350 members and guests attended the convention, the registration lists of which are given below in alphabetical order:

ACTIVE MEMBERS AND GUESTS

Adams, C. A., Madison Sand and Gravel Corp., Solsville, N. Y.; Ahearn, V. P., National Sand and Gravel Association, Washington, D. C.; Allswede, W. H., Hersey Gravel Co., Hersey, Mich.; Alexander, D., Dixie Sand and Gravel Corp., Petersburg, Va.; Ashley, I. W., Lenawee Sand and Gravel Co., Tecumseh, Mich.

Banks, F. R., Detroit Oxford Gravel and Stone Co., Oxford, Mich.; Barbeau, J. N., Paris Sand and Gravel Co., Paris, Ont.; Battjes, H. N., Grand Rapids Gravel Co., Grand Rapids, Mich.; Bauer, H. F., Musk River Gravel Co., Zanesville, Ohio; Revout, G. B., Muskingum River Gravel Co., Zanesville, Ohio; Becker, Bert, Fuller & Becker, Oxford, Mich.; Bingham, F. A., Northern Gravel Co., West Bend, Wis.; Biesanz, C., and Mrs. Biesanz, Biesanz Stone Co., Winona, Minn.; Bierme, A. C., Birnie Sand and Gravel Co., Wilberham, Mass.; Dilleter, F. J., Indiana Gravel Co., Indianapolis, Ind.; Blanton, J. B., J. B. Blanton Co., Frankfort, Ky.; Bliss, W. A., Keystone Sand and Supply Co., Pittsburgh, Penn.; Bohmer, C. H., Ohio River Sand Co., Louisville, Ky.; Bowens, F. L., and Bowens, E. S., McClain Sand Co., Port Marion, Penn.; Bowker, J. E., Birnie Sand and Gravel Co., Springfield, Mass.; Breen, Wm. J., Grand Rapids Gravel Co., Grand Rapids, Mich.; Brokate, G., Home Sand Co., Fremont, Ohio; Brown, A. M.; Brown-Huffstetter Material Co., Indianapolis, Ind.; Brown, W. N., Keystone Gravel Co., Dayton, Ohio; Bryde, W. S., W. S. Bryde Co., Detroit, Mich.; Buckbee, J. C., Northern Gravel Co., West Bend, Wis.; Butler, J. W., Consumers Sand Co., Topeka, Kan.

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Nagle, P., American Manganese Steel Co., Chicago, Ill.; Nicol, W. S., Cross Engineering Co., Carbondale, Penn.; Neuhoff, Hector, Jr., Broderick & Bascom Rope Co., St. Louis, Mo.; Newton, H. W., The Dorr Co., New York.

Ogden, H. W., New Jersey Wire Cloth Co., Trenton, N. J.; Olsen, H., Vulcan Iron Works, Wilkes-Barre, Penn.; O'Neil, W. D., Buffalo Wire Works Co., Buffalo, N. Y.; Owen, A. E., Niagara Concrete Mixer Co., Cleveland, Ohio.

Paige, G. A., Link-Belt Co., Detroit, Mich.; Peete, Wm. R., Hazard Wire Rope Co., Chicago, Ill.; Peirson, H. F., W. S. Tyler Co., Cleveland, Ohio; Pringle, W. D., W. S. Tyler Co., Cleveland, Ohio; Potter, E. R., Allis-Chalmers Mfg. Co., Milwaukee, Wis.; Potter, F. F., Allis-Chalmers Mfg. Co., Milwaukee, Wis.; Potter, W. H., Manganese Steel Forge Co., Philadelphia, Penn.

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Shaw, E., Rock Products, Chicago, Ill.; Schifflin, A. K., Link-Belt Co., Chicago, Ill.; Sittig, A. R., American Manganese Steel Co., Chicago, Ill.; Snyder, N. S., Link-Belt Co., Buffalo, N. Y.; Speer, J. W., Westinghouse Electric and Mfg. Co., Pittsburgh, Penn.; Stewart, W. M., Koppel Ind. Car and Equip. Co., Pittsburgh, Penn.; Sullivan, R. C., Rock Products, Chicago, Ill.

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Wallace, G. T., Fate-Root-Heath Co., Plymouth, Ohio; Warren, J. R., Jeffrey Mfg. Co., Columbus, Ohio; Weiblen, C. F., G. H. Williams Co., Erie, Penn.; Wenault, P. C., Industrial-Brownhoist Corp., Cleveland, Ohio; Welch, F. M., F. M. Welch Engineering Service, Greenville, Ohio; West, P. G., Mead-Morrison Mfg. Co., Boston, Mass.; Wettlanfer, E. L., Niagara Concrete Mixer Co., Toronto, Ont.; Will, R. C., Midland Barge Co., Midland, Penn.; Wilson, W. A., Rock Products, Chicago, Ill.; Wood, C. E., Pit and Quarry, Chicago, Ill.; Wyse, F. O., Bucyrus-Erie Co., Yager, Penn.

Young, C. M., Cincinnati Rubber Mfg. Co., Indianapolis, Ind.; Young, J. L., Timken Roller Bearing Co., Canton, Ohio.

Annual Meeting of Ohio Crushed Stone Association

AT the recent annual meeting of the Ohio Crushed Stone Association the following were elected officers for the ensuing year: Russell Rarey, president; C. C. Beam, first vice-president; H. M. Sharp, second vice-president; E. W. McCall, treasurer. The meeting instructed Claude L. Clark, secretary, to specially urge the association members to subscribe liberally to the National Crushed Stone Association research laboratory.

Decision in Cinder Block Case Does Not Invalidate "Straub" Patents

THE following letter was received by the editor, from the general counsel of the National Building Units Corp. of Philadelphia, and ROCK PRODUCTS is glad to publish it, in the hope that in this way the wrong impression created by the article on "cinder block" in the December 10 issue may be corrected:—

I have before me ROCK PRODUCTS, published December 10, 1927. It carries a story beginning on page 85 containing the unequivocal statement that Straub Patent 1,212,840 "is invalid" and that it was "held invalid" in three infringement suits tried together and recently decided in the Federal District Court sitting at Trenton, N. J.

Judge Bodine's opinion is published in full, correctly as I believe, although I have not compared it with the original. I am handing you herewith a copy of the decree which was entered in each case. You will note that the decree simply dismisses the bills of complaint with costs to be taxed; there is no adjudication of invalidity.

It is not true that the Straub Patent 1,212,840 was declared invalid by the decision in question. I can readily see how, to the lay mind, Judge Bodine's opinion might have seemed to contain such a meaning, but I cannot understand how even a layman could reach such a conclusion after reading the last paragraph.

Two things and two only were decided in these cases: first that the defendants were practicing the prior art and not the Straub process and, therefore, are not infringers. Second, that Straub's invention is limited to the "precise disclosure of the patent."

You will appreciate of course that a story of this sort appearing in such an important publication as ROCK PRODUCTS is causing us, to say the least, a great deal of embarrassment and annoyance.

CHAS. L. PIERCE,
General Counsel.

Mr. Pierce has attached the decree which was entered in each of the three cases, which reads as follows:

DECREE

This suit came on at this term of the Court, and was tried at final hearing and submitted on briefs for both sides; and thereupon, upon consideration thereof, it is

ORDERED, ADJUDGED and DECREED as follows:

That the bill of complaint be, and the same hereby is, dismissed with costs to the defendant to be taxed.

J. L. BODINE,
United States District Judge.

Relation Between Absorption and Soundness Test of Sedimentary Rock*

Samples With Highest Absorptions Generally Proven To Be Unsound

FOR a number of years past an accelerated sodium sulphate soundness test has been used to indicate the resistance of sedimentary rock to repeated frost action. This test was apparently first proposed by M. Brard, and is described in *Annales de Chemie et de Physique* (1828). It has recently been tentatively accepted by the American Association of State Highway Officials as a standard test.

The test consists of alternately immersing the test sample of rock in a saturated solution of sodium sulphate for 20 hours and drying it at 100 deg. C. for four hours. This operation is repeated five times and then the sample is examined as to appearance and the rock classified as sound or unsound. Samples which crack, check or disintegrate are considered as unsound and of questionable suitability for use in concrete which is exposed to frost action for any length of time.

Several attempts have been made to correlate the accelerated sodium sulphate soundness test of rock with the results of other tests which are usually made to determine the quality of the material. These comparisons have usually shown negative results, i.e., there is no apparent relationship between the results of the soundness test and any of the standard tests. Considering, however, that failure in the accelerated soundness test may be caused through crystal growth in the interior of a rock specimen, it is believed that there must be some relation between the soundness test and a test of the porosity of the material. This latter property is usually determined by an absorption test, the test result expressing the amount of absorbed water in terms of percentage of the dry weight of the solid rock.

For the last three years the Bureau of Public Roads has been making the accelerated soundness test on all rock samples of sedimentary origin, as well as marble, which have been submitted for test to determine their suitability for use in concrete, and the tests reported in this paper include the great majority made on such rock. One hundred and fifty of these rocks have also been tested for absorption. The results of these tests, although they do not establish a definite relation between percentage of absorption and unsoundness as determined by the sodium sulphate test, they do indicate that rocks having a certain percentage of absorption will in the greater number of cases prove to be unsound. It is believed that the samples tested include all types and qualities of sedimentary rock which are used as coarse aggregate in concrete, and the range in test values is quite extensive, the absorption ranging to above 6.5%. Results of the standard Deval abrasion test

*Reprinted in abstract from *Public Roads*, December, 1927.

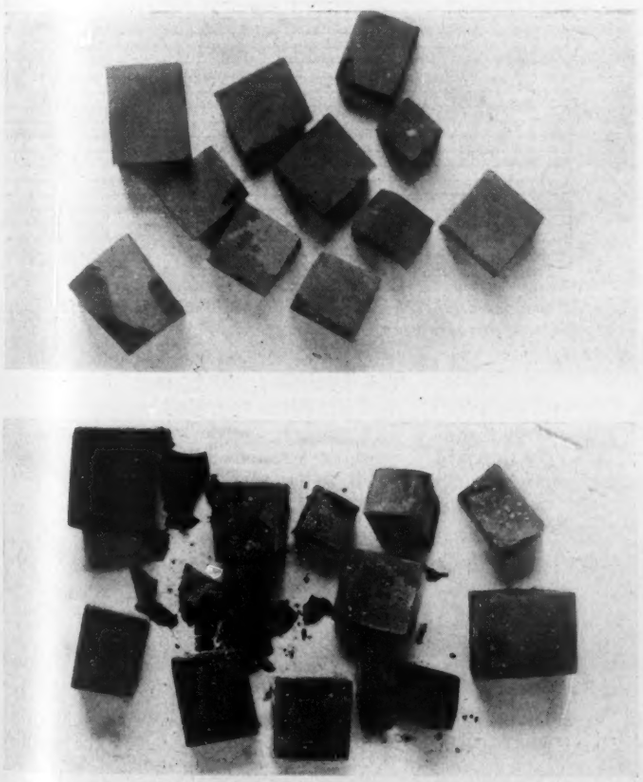


Fig. 1. A limestone sample before and after the soundness test. The rectangular appearance is because sawed material was submitted for testing and is not characteristic of samples prepared for testing

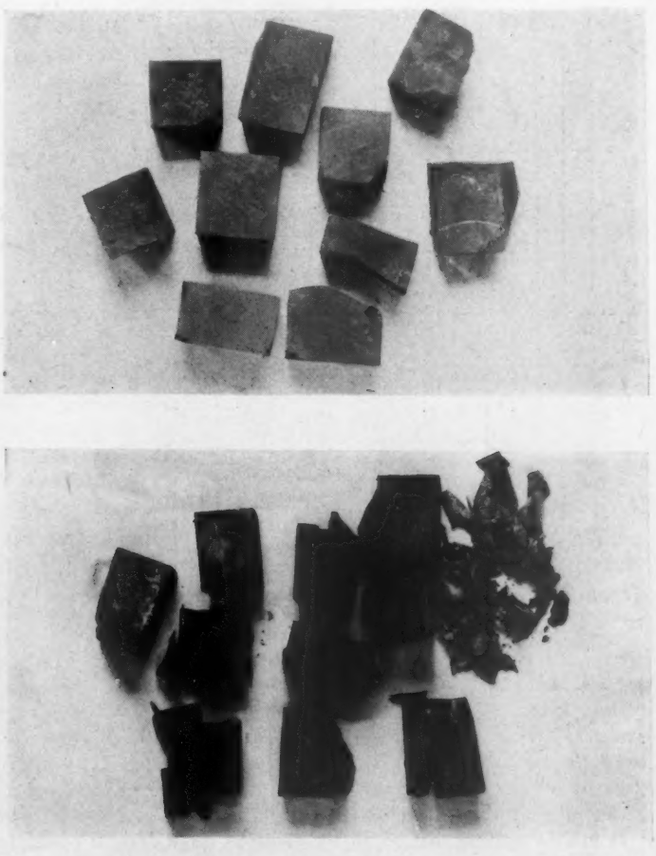


Fig. 2. A limestone sample before and after testing

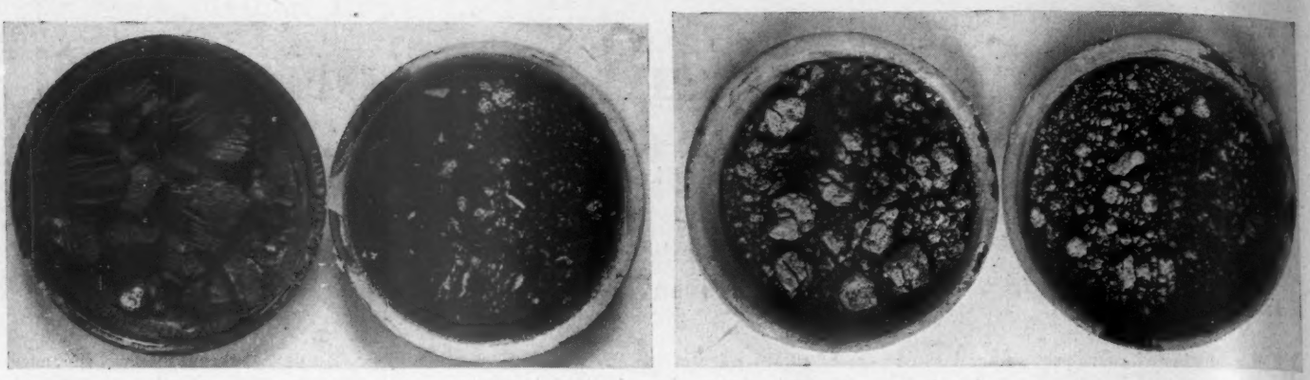


Fig. 3. Three samples which have completely disintegrated in the soundness test and one showing parallel parting. All of these samples had more than 4% absorption

are not shown, but they varied from a minimum of 2.3% to a maximum of 26.2%. The geographical distribution of the samples includes 25 states and Mexico.

Figs. 1 to 3 show typical examples of failure in the accelerated soundness test. Figs. 1 and 2 show samples of unsound rock before and after the test. Fig. 3 shows three completely disintegrated samples and one in which parallel parting is excellently marked. These samples (Fig. 3) had very high absorptions, all of them being greater than 4%.

Fig. 4 shows the absorption of sound and unsound samples grouped according to percentages of absorption. Each group covers a range of 0.5%, the first group including all values up to 0.5%, the second from 0.51 to 1, etc. Fig. 5 shows the number of samples having percentages of absorption equal to or greater than 0, 1, 2, 3, etc., and the percentage of all such groups shown to be unsound by the soundness test.

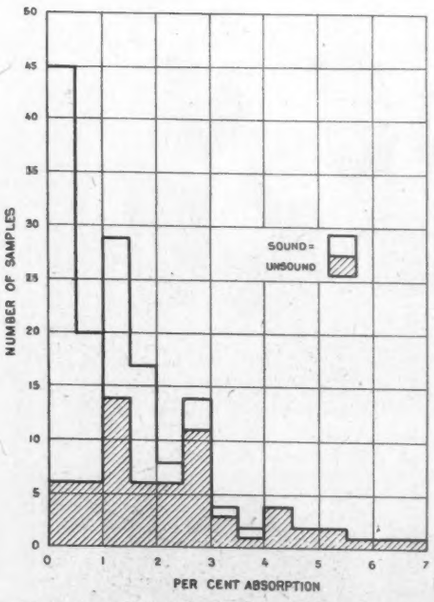


Fig. 4. Proportion of sound and unsound samples grouped according to percentage of absorption

It will be noticed that of all the samples tested, 43% were unsound. Of all samples tested which had an absorption of 2% or more, 82% were unsound. All samples with an absorption of 4% or more were unsound. On the basis of the group of samples reported in this paper, the probabilities, therefore, are that two out of every five samples of sedimentary rock are unsound as determined by the sodium sulphate test.

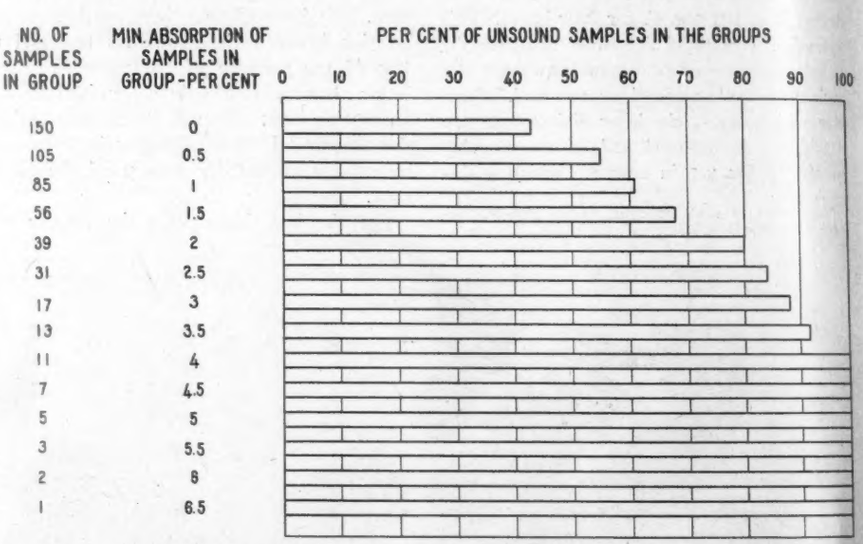


Fig. 5. Proportions of unsoundness in groups of samples having various minimum percentages of absorption

Although the accelerated soduim sulphate soundness test is used to indicate the possibility of failure through frost action, it does not follow that failure from freezing and thawing is always associated with unsoundness as indicated by the test. Many rocks which are seriously affected by the accelerated soundness test have been successfully used in concrete pavements and structures exposed to frost action for years.

The durability of concrete in which unsound rock was used may result from the quality of the concrete and in spite of the quality of the aggregates. A thoroughly water-tight concrete would certainly delay and possibly entirely prevent disintegration by frost action of an unsound rock used as the coarse aggregate. It is apparent that for durable concrete not only the soundness of the ingredient materials should be considered, but also the character of the concrete itself. A discussion of the soundness of concrete is not within the scope of this paper; but as the character of concrete is variable and subject to many conditions which may affect the quality, every effort should be made to control these factors. For this reason, the use of aggregates of unquestioned durability or soundness is important. In this connection the accelerated sodium sulphate soundness test is of value in indicating questionable aggregates. Samples which show unfavorable results with this test should be further investigated by inspection of exposed ledges or faces of the stone at the quarry, or of concrete made of the rock, if it has been previously used.

The high percentage of possible failure indicated above shows that great care should be exercised in the selection of sedimentary rock for use in concrete.

These results seem to indicate that, when time is limited, some idea of the relative behavior in the sodium sulphate soundness test of several otherwise comparable materials may be obtained from the absorption test, the highest values indicating the greatest probabilities of failure in the other test.

Columbia Division, Pittsburgh Plate Glass Co. Doubles Cement Plant

A Wet-Process, Waste-Heat Power Plant with Some Unique Features

By C. M. Soule and L. M. Zepp
Consulting Engineers, Baltimore, Md.

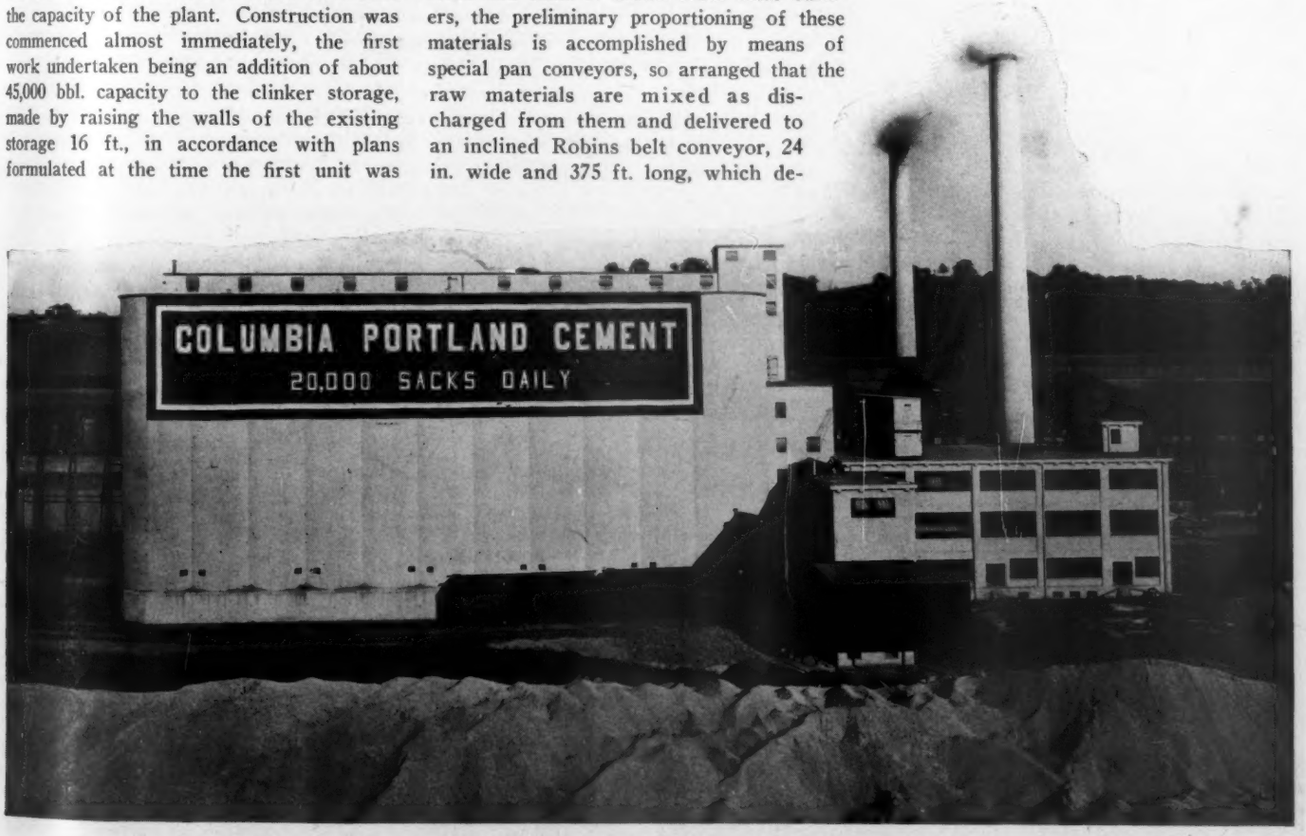
THE TWO-KILN CEMENT PLANT of the Columbia Division of the Pittsburgh Plate Glass Co. at East Fultonham, near Zanesville, Ohio, was constructed during 1923 and 1924, going into production in June of the latter year. This plant was an outgrowth of the company's quarry and crushing plant at this location where a high grade limestone is quarried, and sized for use at the company's Columbia Chemical Division at Barberton, Ohio. It was primarily constructed to utilize the great quantity of fines from this crushing plant, which were not suitable for chemical stone, and for which there was little local market. This first unit was fully described in an illustrated article which was published in ROCK PRODUCTS, May 3, 1924.

The immediate success of the project, particularly as regards the exceptional quality of the cement produced, was such that in the fall of 1925 it was decided to double the capacity of the plant. Construction was commenced almost immediately, the first work undertaken being an addition of about 45,000 bbl. capacity to the clinker storage, made by raising the walls of the existing storage 16 ft., in accordance with plans formulated at the time the first unit was built. While this work was in progress plans were gotten under way for the addition, so that construction continued uninterruptedly until its completion in the early summer of 1927, although necessarily somewhat slowly, due to the exigency of keeping the original plant in full production during the progress of the work. The capacity of the completed plant is 5500 bbl. per day.

Flow of Material Described

The stone and shale are delivered to the cement plant crushing house in the company's standard railroad hopper cars and dumped into separate concrete bins, from which they flow by gravity to Pennsylvania hammer mills, which reduce the materials to compeb mill feed size. These hammer mills discharge directly to inclined open bucket elevators which deliver the raw materials to separate storage bunkers. As the stone and shale is drawn from these bunkers, the preliminary proportioning of these materials is accomplished by means of special pan conveyors, so arranged that the raw materials are mixed as discharged from them and delivered to an inclined Robins belt conveyor, 24 in. wide and 375 ft. long, which delivers the raw mix to storage bunkers over the raw mills. This part of the original plant was designed of sufficient capacity to provide raw materials for two additional kilns and no changes were required here except the speeding up of the belt conveyor to handle the additional load. The view, Fig. 1, shows the bridge for this conveyor from the crushing plant to the raw mill.

The conveyor from the crushing plant originally delivered the raw material to a point midway between the two bunkers which supplied the existing raw mills, from which point it was diverted to either bunker by means of a simple deflector. With the installation of three new raw mills, these bunkers were extended longitudinally 75 ft., and the new section divided by partitions into four compartments, one for raw mix for each new mill and one for shale. In



Cement mill of the Columbia Division, Pittsburgh Plate Glass Co., Fultonham, Ohio, after new construction which doubled its capacity

order to distribute the material from the belt conveyor to the bunkers so as to fill them to capacity, the head of this conveyor was raised and rebuilt, and arranged to discharge to a Robins 24 in. wide, reversible shuttle conveyor which feeds the material to any point along the line of six bunkers. It is of interest that this work was so arranged

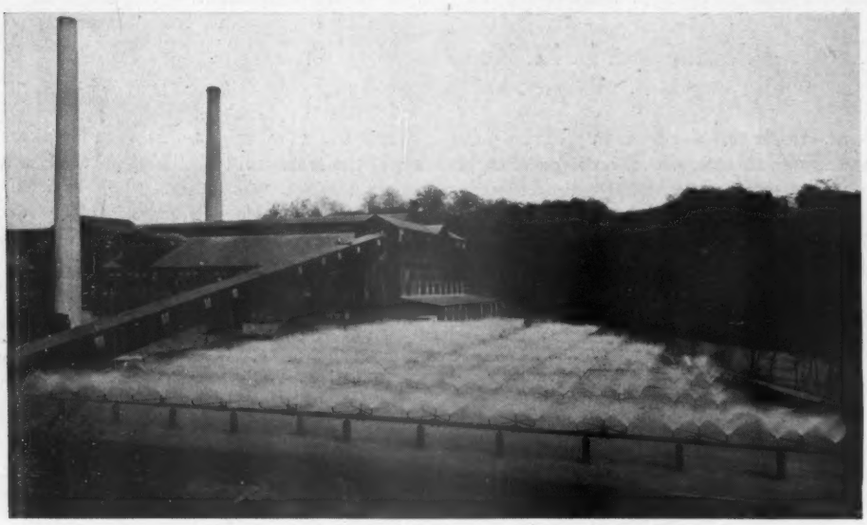


Fig. 1. Spray pond for cooling condenser water. The south end of the plant and conveyor bridge from crusher house to raw mill shown at the left

that the actual change over from one conveying system to the other was made in about six hours, which is well within the storage capacity of the bunkers, so that the raw mills were able to continue operation without interruption.

The raw mill is now equipped with five Allis-Chalmers compeb mills, the two original 7 ft. x 26 ft. mills and three new ones, 8 ft. x 7 ft. x 26 ft. driven by 500-hp. General Electric synchronous motors through 60-in. Cutler-Hammer magnetic clutches. The finishing compartments of these mills are lined with wave-type rubber lining manufactured by the Goodrich Rubber Co.

Automatic Control of Mix

In order to keep a continual check on the capacity of the raw mills, 20-in. Schaffer poidometers have been installed under the bunkers, discharging directly to the compeb mill feeders. This arrangement enables the mill foreman to detect almost immediately the failure of any mill to meet its predetermined capacity and to make an inspection and correct the fault at once. thus keeping his entire grinding department up to capacity at all times. These poidometers are equipped with the liquidometer attachment which assures the feeding of a predetermined definite proportion of water to the mill along with the raw material, thus keeping the moisture content of the slurry constant and at the minimum for the best operating conditions. The poidometers are driven by 3½-hp. direct-current motors, connected to the poidometers through DeLaval speed reducers and roller chain drives.

A screw conveying system from the shale bunker allows straight shale to be fed to three of the five mills, through the poidometers, if required.

Bins for storing grinding media are located in a lean-to bay northwest of the raw mills. A travelling electric hoist, with cab control, operates on a monorial system alongside this storage and over the mills, permitting quick and easy handling of mill charges and removal and replacement of mill parts. Fig. 2 shows the raw mill motors and Fig. 3 the raw mills with the overhead monorail system for charging the mills and making repairs.

Slurry Handling

The slurry discharged from the five raw mills is handled by screw conveyors to a central collecting basin, from which it is pumped by a 4-in. Morris centrifugal pump to the correcting tanks. The operation of this pump is automatically controlled by a special float valve in the collecting basin, which maintains a minimum head on the suction side of the pump sufficient to eliminate the entraining of air in the suction pipe, which had been the cause of considerable annoyance. Two pumps similarly controlled are installed here and while ordinarily one is used for stand-by service only, the piping is so arranged that they may be operated simultaneously if desired.

The original slurry tanks, eight in number, are 18 ft. in diameter and 34 ft. high. These are now used as correction tanks only, provisions for the finally corrected slurry being made by the construction of an additional storage basin. The piping to these tanks has been entirely rebuilt and is especially flexible in its operation, being so arranged that either one or both of the Morris pumps can deliver the slurry to one or more of the tanks at the same time. Merco-Nordstrom plug valves are used throughout the slurry piping system.

Compressed air is used exclusively for agitation in the correction tanks, the air

Fig. 2. Raw mill motor room showing the 500-hp. synchronous motors, raw grind bunkers and poidometers

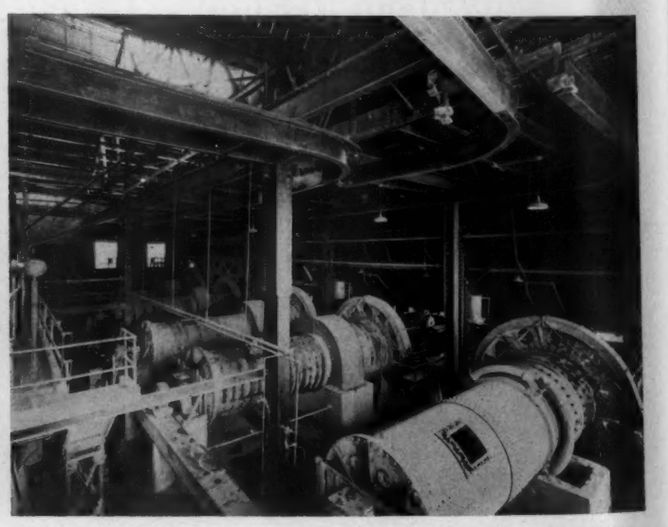


Fig. 3. Raw grind compeb mills and overhead monorail system for charging the mills and making repairs

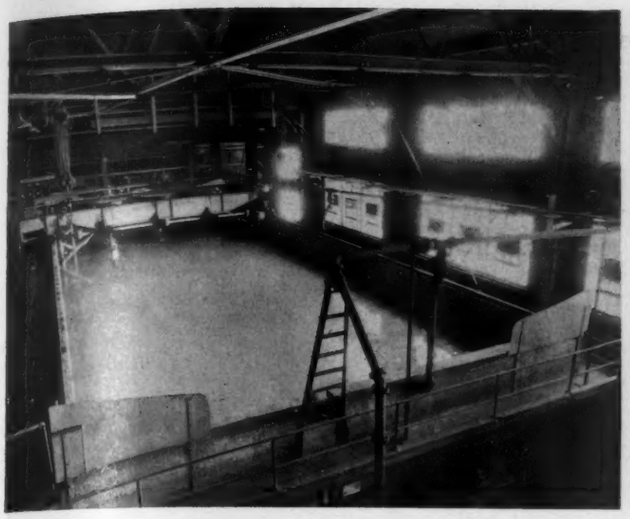


Fig. 4. Corrected slurry basin showing the traveling agitator in the background

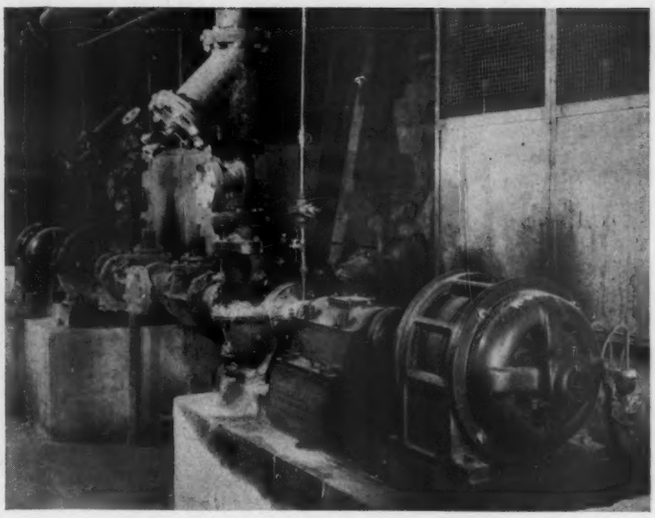


Fig. 5. Slurry pumps delivering slurry from the basin to the kiln feed tanks

valves being operated from an overhead walkway between the tanks so that the results are clearly discernible to the operator. With the arrangement of air piping installed, excellent results are obtained with a surprisingly small consumption of air.

Slurry samples are taken hourly as the tanks are filled and carefully checked by the chemists for the iron, silica, alumina and lime content. Average 8-hour samples are also prepared, and the results of these analyses checked against the others.

A new concrete basin, 35 ft. wide, 84 ft. long and 21 ft. deep has been constructed for the reception of the finally corrected slurry. This basin has an active capacity of slurry for 6200 bbl. of cement. It is equipped with an F. L. Smidth travelling agitator having three sets of rotating arms with auxiliary air agitation from air pipes carried on the arms. Additional air agitation is also provided at the corners of the basin. The slurry is delivered at both ends and at midway points on the sides of the basin simultaneously, insuring rapid distribution of new material as it is added. A battery of two 4-in. Morris centrifugal pumps serves for filling this basin and for the transfer and blending of the slurry in the correction tanks. The piping for these pumps is so arranged that both pumps can be used for blending, or both for filling the basin, or either one can be used for filling the basin while the other is blending, without interference. Provision has also been made so that if desired the slurry may be pumped directly from the correction tanks to the kiln feed tanks, by-passing the agitator basin. This arrangement of piping practically eliminates any danger of shutdown due to trouble with either a pump or the travelling agitator.

The operation of the new slurry system has been signally successful; the variation of the slurry content in the new agitator basin can be held to within 0.2 of 1% of the control ratio.

Fig. 4 shows the basin for corrected slurry and the traveling agitators.

Kiln Feeds

The slurry is drawn off from the agitator basin by two 4-in. Morris pumps, which are shown in Fig. 5, and pumped to individual kiln feed tanks located underneath the kilns, which are 18 ft. in diameter and 20 ft. 6 in. high. The material in these tanks, as in the case of the correction tanks, is agitated by air exclusively. One pump suffices for this service, the other being used as a standby.

From the kiln feed tanks the slurry is pumped by four Morris pumps, set in pairs, to two F. L. Smidth feeders, each feeder supplying two kilns. The discharge from these feeders to the kilns is controlled from the kiln firing platform and the overflow returns to the kiln feed tanks by gravity.

Here also the pumps and piping have been so arranged as to nullify any chance of shut-down due to c e or two pumps being out of commission. The pumps are set in pairs and so connected that either pump in the pair can draw from one or both of the adjacent feed tanks. On the discharge side, any one of these pumps can if required, feed both feeders or four kilns, the overflow being returned to the tank or tanks being used as a source of supply.

The slurry flows from the feeders to the kilns by gravity and in three kilns is fed to

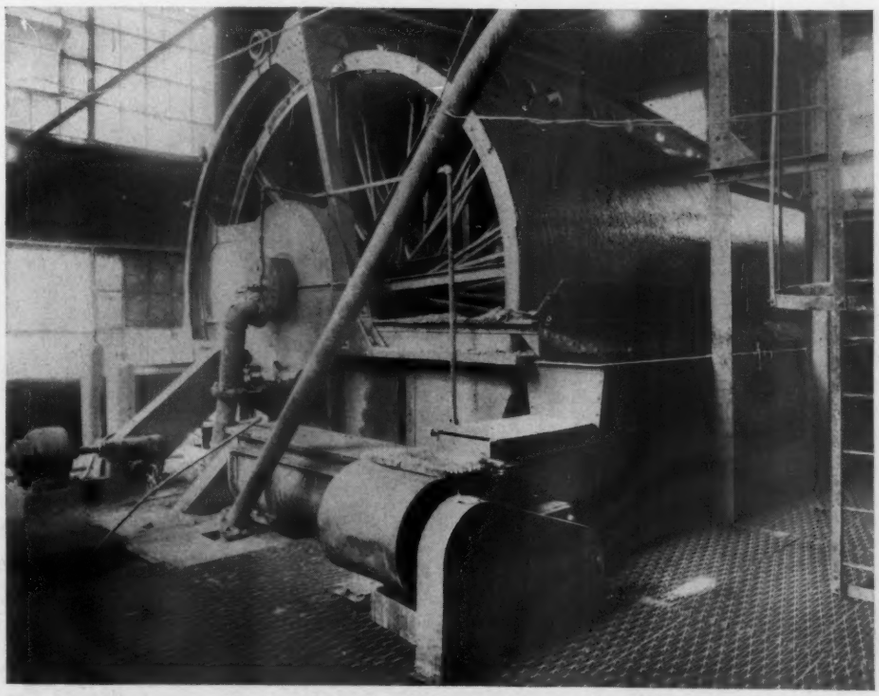


Fig. 6. Continuous filter for dewatering cement slurry installed at one of kilns

the kiln in the usual manner. One of the new kilns is equipped with an Oliver continuous filter for dewatering the slurry, which is shown in Fig. 6. This filter reduces the moisture in the 33% slurry from the agitator basin to approximately 18%. When dewatered, the filtered "cake" is discharged over a scraper along the length of the wheel into a special conveyor which delivers the semi-dry material to the kiln uniformly and continuously.

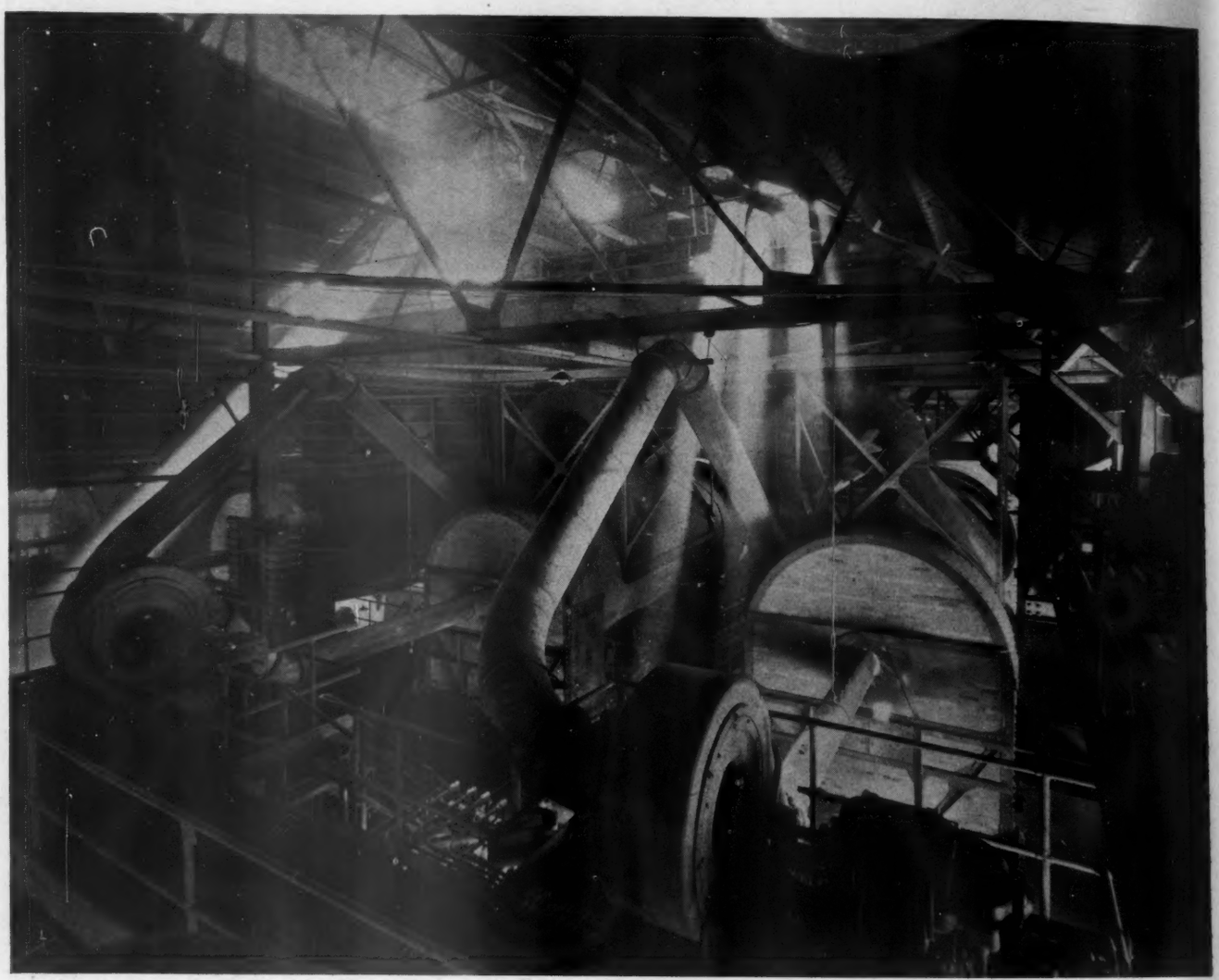


Fig. 8. Firing end of the new kilns showing the hoods connected to dryers for collecting the radiated heat. Note the fans for drawing the coal direct from the mills and discharging to the kilns

Kilns Fired by Unit Pulverizers

The two new kilns are duplicates of those originally installed, of Worthington manufacture, 10 ft. in diameter and 165 ft. long. The kiln-firing system, however, is entirely new and we believe is the first installation of its kind in the cement industry, the Fuller-Bonnot unit coal mill being used, which has hitherto been applied only to the firing of stationary boilers. In this installation the coal is delivered in the company's standard hopper cars and dumped into a track hopper over a 24-in. x 24-in. Jeffrey single-roll crusher, which reduces the coal to 2½ in. and smaller.

From this crusher the coal is conveyed by a Chain-Belt Co. continuous V-bucket elevator-conveyor to storage bunkers in the kiln building, located over the firing end of the kilns. From these bunkers the coal flows by gravity through vertical Fuller-Randolph driers, located between the kilns, where it is dried by radiated heat drawn off through hoods from the hot zone of the kiln. From the driers the coal passes to the Fuller-Bonnot air swept ball mills which are located on the kiln-room floor just in front of the first kiln piers. The coal when ground to the proper fineness in the mill is picked up by the air current through the mill, passed through a separator which returns the coarse particles for regrinding, and is blown directly through the firing pipe to the kiln. A 60-in. fan, direct-connected to a 50-hp. motor, performs this duty while a 75-hp. motor, direct-connected through a DeLaval speed reducer, drives the mill itself.

The radiated heat from the kiln, which would otherwise be lost, has proven more than sufficient to supply the needs of the drier for any coal so far received although provisions have been made in the construction of the discharge chamber from the kilns to the coolers for tapping this source of heat if needed. A 60-in. fan, direct-connected to a 40-hp. motor, is used to pull the heated air through the drier, this fan discharging into a cyclone dust collector which in turn discharges the collected material back to the hopper at the bottom of the drier.

The control which governs the supply of coal fed to the kilns is located on the firing floor within easy access of the burner.

This system is compact and dustless, requires no separate housing facilities nor special conveying equipment, and from its extreme simplicity should prove very economical in upkeep. Fig. 7 shows the grinding mills and Fig. 8 the fans and piping from the mill and to the kiln. These fans are located on a platform well above the firing floor with free passage underneath.

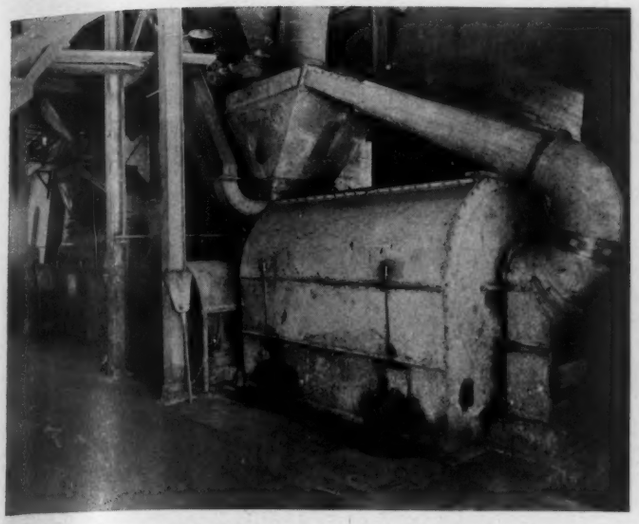


Fig. 7. Unit coal mill and the bottom of the coal dryer hopper, pipe and fan feeding the kiln

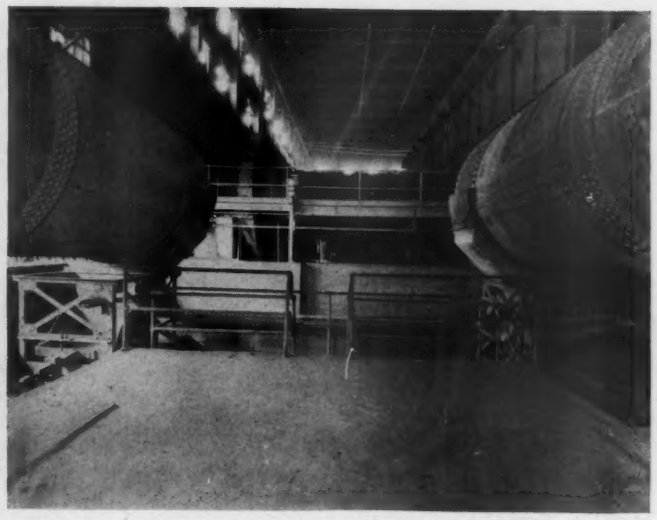


Fig. 9. Discharge end of the coolers showing the recording rotary clinker scales

Fig. 8 also shows the hoods over the kilns and their connection to the top of the driers.

The two old kilns are fired with pulverized coal in the usual manner, the coal mill, equipped with Fuller-Lehigh dryer, Fuller mills and Fuller-Kinyon transport system, being located in a separate building some distance to the east of the kiln building.

Clinker Cooling and Handling

The kilns are followed by coolers of Worthington manufacture, 8 ft. in diameter and 80 ft. long, which are duplicates of those in the original plant, except that the drives have been located at the piers nearest the discharge end. These coolers discharge the clinker to rotary clinker scales, manufactured by the Vulcan Iron Works, which record automatically the production of each kiln. These scales are shown in illustration in Fig. 9.

In normal operation these scales deliver the clinker to special Chain-Belt Co. drag conveyors, installed under both old and new coolers, which bring the material to a central point, where it is raised by a bucket elevator to the top of the finished mill feed bins and conveyed along the top of these bins by a special Chain-Belt drag conveyor, arranged to feed the bins direct, or to convey the clinker to the storage where it can be distributed by the overhead crane for seasoning. At the present time, in line with the company's policy of keeping the quality of the cement as high as possible, all the clinker is delivered to the clinker storage for seasoning and brought back after seasoning to the finish mill bins by the overhead crane.

In case of break-down in clinker scales or conveying equipment arrangements have been made for bypassing this equipment and discharging the clinker direct from the coolers to new clinker pits, which have been constructed in front of the coolers, one pit serving two coolers and each pit being 49 ft. long, 12 ft. wide and 12 ft. deep. Clinker discharged to these pits can be reclaimed by the overhead traveling crane and conveyed either to finish mill bins or to the clinker storage.

Changes in Finish Mill

The entire finish mill layout has been radically changed. The original plant was laid out with provision for four 7 ft. x 26 ft. Allis-Chalmers finishing compebs, two of which were installed when the plant was built. These mills were located north and south, i. e., with their axes in the same direction as the coolers, with the feed bins running across the mills from east to west, adjacent to the discharge end of the coolers. Shortly after the plant was put into operation it was found desirable to install a third mill for stand-by service and to take care of some excess kiln production which the two mills would not handle. This arrangement left room in the existing structure for only one additional mill if placed alongside the existing three.

Fig. 10. West side of finish mill. The clinker elevator is in the right foreground, finish mill feed bins (right center) and the clinker storage in the background

It was felt that with the addition of two kilns at least five 7 ft. x 26 ft. finishing compebs should be installed, with provision for a sixth. This result was accomplished without adding materially to the existing building by turning the mills through an

angle of 90 deg., with their axes running east and west, thus providing for six mills, three on the east side of the center line and three on the west, the feed ends of each trio pointing toward the center of the building and the discharge ends toward the outer wall. The existing feed bins were also swung about 90 deg. and utilized, now extending north and south along the center line of the building.

With this new arrangement the controls and feeders are all accessible from one central platform under the bins and no more labor is required for the operation of the six mills than was formerly required for the three. The 500-hp. Crocker-Wheeler synchronous motors which drive the mills through 60-in. Cutler-Hammer magnetic clutches have been housed in small lean-to structures outside the main mill room, keeping them isolated from the dust.

While the advantages of this layout were obvious, some doubt was expressed as to the advisability of making this change due to the fact that accumulated orders were such as to demand continuous operation of the finishing department. It is worth noting in this connection that the change-over was accomplished with no less than two finish mills in service at any time.

The present installation consists of five 7 ft. x 26 ft. Allis-Chalmers finishing compeb mills, with foundation below the floor line in place for the installation of the sixth mill when production demands it.

The finish mills discharge through Richardson automatic cement scales, which record the output of each mill, to a screw-conveying system located below the finish mill floor, which carries the cement to an elevator in the northeast corner of the mill, from which it is discharged, after screening to remove foreign material, to a bin over the Fuller-Kinyon pumps.

A "Dracco" dust-collecting system is now being installed which, it is expected, will render working conditions in the mill room as nearly ideal as possible.

Fig. 10 shows the west half of the finish mill as rebuilt.

Two 8-in. Fuller-Kinyon pumps deliver the finished cement to both the old and new stockhouses, the original system of elevators, belt and screw conveyors in the old stockhouse having been abandoned. The piping from these pumps is so arranged that by a very simple change over either pump can deliver to either stockhouse; or both can operate at the same time, one delivering to each storage. This flexibility reduces to a minimum the chance of an entire shutdown for pump repairs. Fig. 12 shows these pumps as installed.

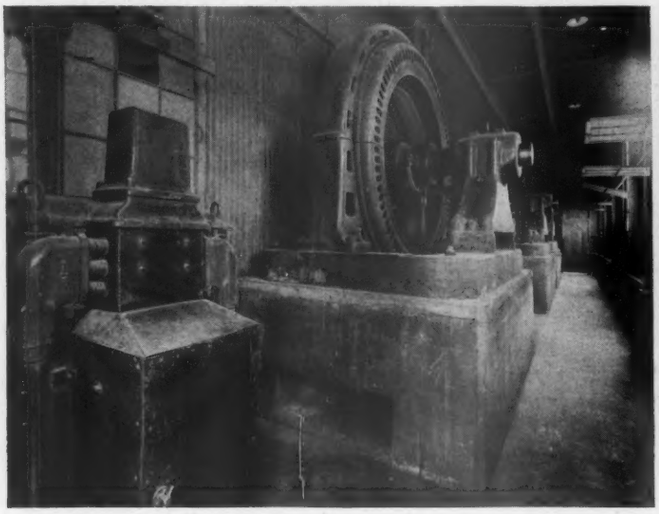


Fig. 11. One of the 500-hp. push-button operated synchronous motors driving a finish mill

Fig. 12. Two 8-in. cement pumps pumping finished cement to stockhouses

Silos and Packing Plant

The new cement storage is composed of 12 silos, 32 ft. in diameter and 85 ft. high, arranged in a double row with both interspace and outerspace bins. This new house provides a storage for approximately 300,000 bbl. of finished cement, giving in conjunction with the original stockhouse a total storage capacity of about 450,000 bbl. Cement is drawn off from these silos by screw conveyors operating in tunnels underneath the bins, the bin bottoms being so hoppered as to make them self-cleaning. These screws convey the system to a double system of cross screws and elevators in the packhouse, so arranged as to make a packhouse shutdown from the failure of individual units practically impossible. These elevators discharge the cement over "Hum-mer" vibrating screen to the packing bins.

The main packhouse, which constitutes the south end of the new bin structure, is equipped with two 4-tube Bates packers with belt conveyors for delivering the bagged cement to cars on either side. An auxiliary or "island" packhouse is constructed to the west of the main building and is equipped with a single 4-tube Bates machine with a reversible belt conveyor to load cars on the east side, or trucks, on the west. This auxiliary packhouse is connected with the main structure by an overhead bridge which carries the screw conveyor feeding the packing bin and serves as a truck way for bag trucks, the bags being fed to the packers from this level through chutes. The screw for handling the overflow and spillage runs back to the main packhouse in a tunnel below the tracks.

A three story and basement reinforceed-concrete building 67 ft. x 100 ft., adjoining the main packhouse on the south serves as a bag storage and houses the cleaning, sewing and tying departments for the entire plant. Returned bags are delivered from cars or trucks through chutes to the basement and are carried to the third floor on an Otis platform elevator. On the third floor the bags are sorted on special screen top tables, which are provided with hoppers to which suction is applied to immediately eliminate the dust which arises. Rejected bags are stored in bins and held for a limited time for the customers inspection, while the other are handled by a belt conveyor to the receiving hopper of a continuous bag wheel manufactured by the Nazareth Foundry and Machine Co., which has a capacity of 4000 bags per hour. The bag wheel discharges the cleaned bags to a belt conveyor on the second floor, which passes between a double row of sorting tables, where they are sorted and stacked. Sewing and tying machines are also located on this floor which is but a few feet above the packer seats in the main packhouse, enabling these packers to be immediately supplied with a minimum of effort.

Car Handling

The facilities for handling cars loaded for shipment is somewhat unusual and

worthy of mention. Loaded cars are dropped away from the packhouse by gravity to a point where they are picked up by the company's yard locomotives and hauled over a track scale to a classification yard where they are classified for shipment. This yard is located on the company's property adjacent to the tracks of the New York Central and Pennsylvania railroads but is outside the cement plant site. Empty cars are brought over from the yard by the plant locomotives and placed at the stockhouse for loading.

By this arrangement a continual supply of empties in place at the packhouse is assured so that loading can proceed continuously; the cement plant yard is relieved of the congestion of loads awaiting shipment: and shipments of loaded cars are expedited because of proper classification in the yard before the cars are picked up by the railroad.

Waste-Heat Power plant

Power for operating the entire plant is generated by steam supplied by waste-heat boilers connected to each kiln. The original plant is equipped with Edge Moor boilers of 900-hp. rating while the two new kilns are connected to Rust type, vertical-tube boilers built and erected by the Babcock and Wilcox Co. These new boilers are equipped with B. & W. superheaters and steel economizers and are rated at 1044-hp. at 175 lb. normal working pressure and 100 deg. superheat. Green Fuel Economizer Co. fans, driven by direct-connected, variable-speed motors, furnish induced draft through the boilers and discharge the gases through a concrete flue to a new reinforced-concrete stack, built by the Rust Engineering Co., 10 ft. in minimum diameter and 220 ft. high. The damper arrangements are such that either one or both boilers may be by-passed, and the kilns operated on stack draft.

Fig. 15 shows the waste-heat boiler settings and fans, the steel economizers being visible above the brickwork.

A 400-hp. hand-fired boiler for starting up was installed in the original plant. This boiler has been recently equipped with a Riley stoker.

An exceptionally complete instrument board, located in the power house along the wall adjacent to the boiler room (see Fig. 19), keeps a complete record of the performance of each boiler and kiln. Brown recording instruments show graphically the economizer temperatures; the draft at the second and third boiler passes; the temperature of the kiln feed chamber; the CO_2 content of the kiln gases; and the temperature of the de-aerated water fed to the boilers. Bailey recording meters show the temperature of steam, flue gas and boiler feed water; the flow of steam in pounds: and the quantity of boiler feedwater in pounds and gallons. Hand-operated instruments are provided for the use of the power plant engineer in taking momentary check readings of temperatures, drafts, etc., and a master steam gauge, legible from any point in the power house, is located above the instrument board.

Steam is delivered to the turbines through a loop system of piping, so arranged as to minimize the chance of shut-down due to trouble in valves or header. The boiler feed water is delivered to the boilers by means of DeLaval steam driven turbine and electrically driven centrifugal pumps through a similar loop system, for like reasons.

The available water supply is not suitable for boiler feed water and to insure a continual supply of pure water for this purpose, so that shut-downs for cleaning scale will be largely eliminated, an evaporator system, manufactured by the Griscom-Russell Co., has been installed. The evaporator is operated by excess steam produced by the boilers.

An automatic valve, installed in the main header over the boilers, is so set that when excess steam is available such steam is delivered to the evaporator instead of blowing off through the safety valves. The evaporator is automatically supplied with creek water by a pump which draws its supply from a heater located on the first floor of the evaporator house. Low pressure steam is supplied to this heater and also to the de-aerator by collecting the exhaust from the various steam driven units and also by some bleeding of the turbines. When full use has been made of this steam it is passed through a condenser and the condensate added to the evaporated water for treatment by the de-aerator. All condensate from the office and laboratory heating systems, steam traps, etc., is collected and utilized, cutting the heat loss in the entire plant to a minimum.

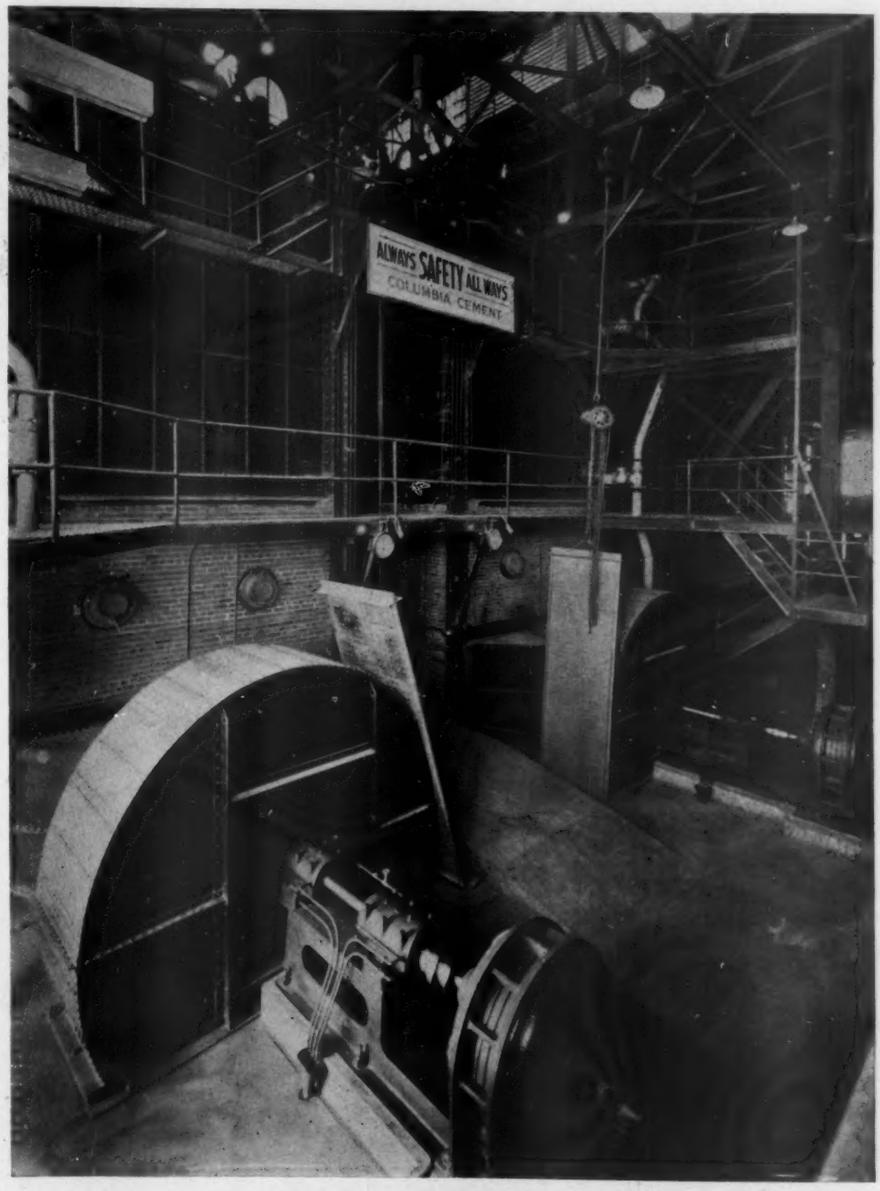


Fig. 15. Waste heat boiler settings and fans. The economizers show above the brick work

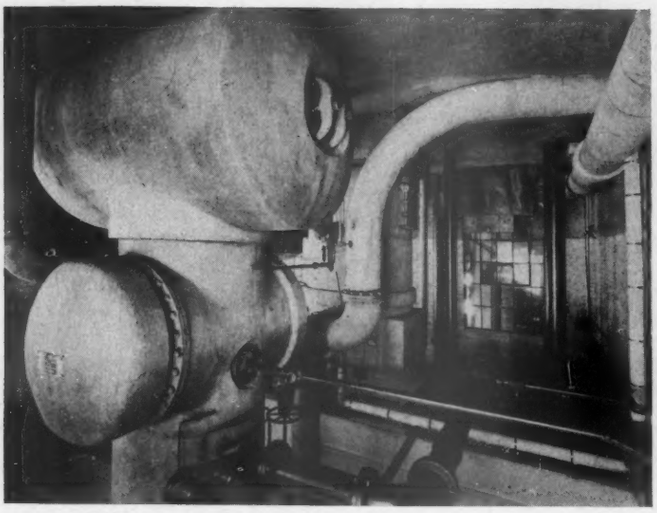


Fig. 16. First floor of evaporator house, showing the de-aerator in the foreground and water heater in background

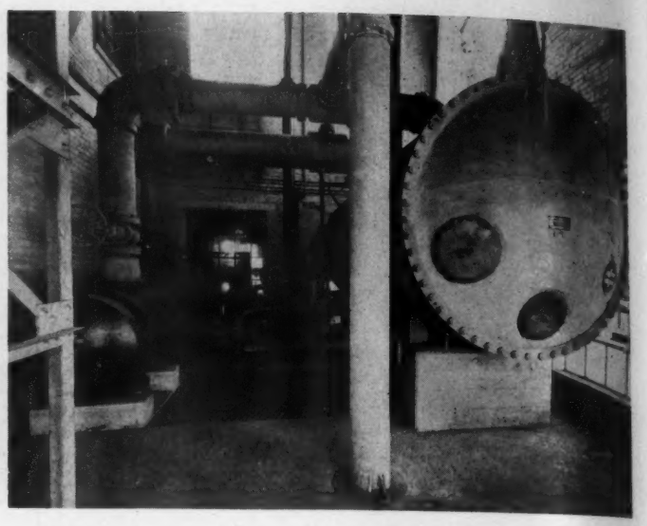


Fig. 17. Second floor of evaporator house. The evaporator is at the right and condenser at the left

Two concrete storage tanks, having a combined capacity of 233,000 gal., receive the condensate from the turbine condensers and are also connected to the de-aerators by automatic valves. These tanks "float" in the system and serve as a reserve supply for use when the evaporator is not functioning, the flow from this storage being automatically controlled. Bypasses have been provided so that in emergency the boiler feed pumps may be supplied direct from storage or even with raw water if a condition should arise where this would be necessary to keep the boilers in operation.

Figs. 16, 17 and 18 show the evaporator installation, which is unique in its application in the cement manufacturing industry.

Two new 2500 kw., 2300-v. Westinghouse turbo-generators supply the normal power requirements of the plant, the two original 1250-kw. Allis-Chalmers machines being now used for standby service. With these four generators and the loop steam system before mentioned, all necessary combination hook-ups can be made to meet any variation in the demands of the plant. Both old and new turbines are equipped with surface condensers manufactured by the C. H. Wheeler Co., and radio-jets of the same manufacture maintain the vacuum in the turbines. In the new installation the latter have been located on the main power-house floor adjacent to the turbines, as shown in Fig. 19, instead of in the basement as in the case of the original machines, which improves operating conditions materially.

Both old and new generators have been equipped with Griscom-Russell air coolers to insure a supply of clean, cool air at all times. The water for these coolers, as well as for the radio-jets and the oil coolers, is hooked up to artesian wells as well as to the regular plant supply so that in extreme warm weather, or in times of water shortage, the cold water from the deep wells is available to insure the proper cooling of the generators and the maintenance of the proper vacuum in the turbines.

The water supply for the plant is obtained by damming a creek which flows through the property, and conducting the water therefrom, through a concrete tunnel, to a cold well, located east of the power house, which serves as a supply for all pumps.

To conserve the supply in times of shortage and to provide water of the proper temperature for the condensers during extreme warm weather, a spray pond, equipped by the Spray Engineering Co., has been constructed. Water from this pond, which is shown in Fig. 1, may be returned direct to the cold well through a concrete flume with an automatic head gate, actuated by float controls in the cold well, or returned via the creek and tunnel. In cold weather the spray pond is bypassed and the warm water returned to the creek above the dam, where it helps in keeping this part of the water storage free from ice.

The excitation for the generators and the direct current requirements for the entire plant are obtained from three new 75-kw. Crocker-Wheeler motor-generator sets. One of these is sufficient for the turbo-generator excitation, while the other two are used for generating the direct current requirements for the plant. Three 27½-kw. motor-driven exciters and one 25-kw. steam-driven ma-

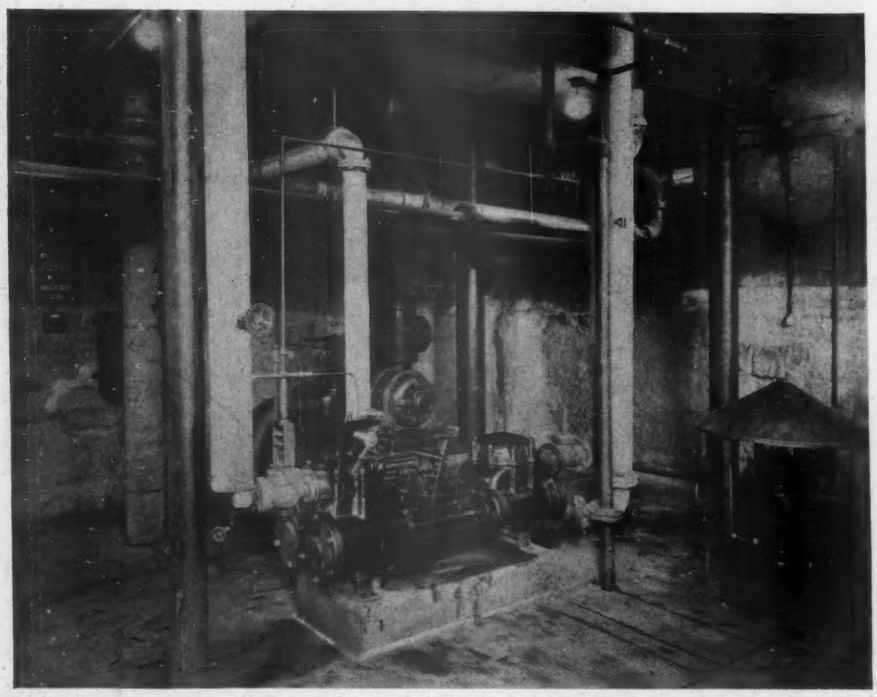


Fig. 18. Basement of the evaporator house showing the duplex pump delivering water to the evaporator (foreground) and the centrifugal condenser pump in the background

chine, manufactured by the Allis-Chalmers Manufacturing Co., which were installed in the original plant, are now held in reserve for stand-by service.

The main switchboard, located in the power house, is composed of 35 panels and is 75 ft. long. It is equipped with the most modern indicating and recording instruments, switches and circuit breakers as well as an elaborate indicating system of colored lights, visible over the entire power house. This board was built in its entirety by the company's electrical forces, working under the direction of the electrical engineer of the plant. This was done so that the change-over incident to the new plant addition could be made as opportunity offered to work here without interference with the plant operation, this having to be constantly kept in mind.

The largest motors operate on 2200-v. and the secondary motors on 440-v., the 2300-v. current from the generators being stepped down through outdoor type Westinghouse transformers, located south of the power house. A 1500-k.v.a. break-down service from the lines of the Ohio Power Co. to the busses on the main plant switchboard has been installed, the power coming in at 22,000 v. and being stepped down to 2300 v. through outdoor transformers adjacent to those just mentioned. This service is not ordinarily required, but is left floating on the line in case of need. By this arrangement excess power generated when mills or other large units, except the kilns, are down for short periods, is sent back into the Ohio Power Co. lines rather than having the steam wasted by blowing off at the boilers. A double-recording General Electric recording watt meter shows graphically whether power is being delivered to or taken from the Ohio Power Co. line, while watt-hour meters register the amount of out-going and incoming power. Relay protection has been installed to obviate any chance of the power company taking the entire load of the cement plant or vice versa.

Wiring and starting equipment throughout the plant has been installed with extraordinary care and workmanship, using the best and most modern appliances and equipment. Disconnect switches are installed before all 2200 v. motors. Start and stop push button controls for automatic starters are located at convenient points so that in case of trouble with one unit in a series operation the whole system can be immediately stopped. In case of power house trouble, the pulling of a switch sounds an alarm on the auto-call throughout the plant, warning machine operators to stand by for shut-down in proper sequence. Such care has been taken with the electrical protective system that in four years operation only two motors have been lost, the motors connected at present throughout the cement and stone plants now numbering 335, ranging in size from 3½ to 500 hp.

Three DeLaval centrifugal pumps and two duplex steam pumps furnish the water for plant service and fire protection. They are so arranged and connected that any single pump or combination of pumps can be used for fire or ordinary service or both. Bailey recording flow meters keep a graphical record of all water used. Cooling water for the compressors and miscellaneous machine bearings is filtered mechanically to remove foreign material and after use is collected and returned to the cold well.

A new 1500-cu. ft. Ingersoll-Rand air compressor, driven by a 300-hp. direct-connected motor, has been installed to furnish the compressed air required. Two smaller compressors, which were installed in the original plant, have been relocated and are now used for stand-by service and to supply air for the air-lift pumps for the artesian wells when these are in service.

Office and Laboratory

A new office building has been recently

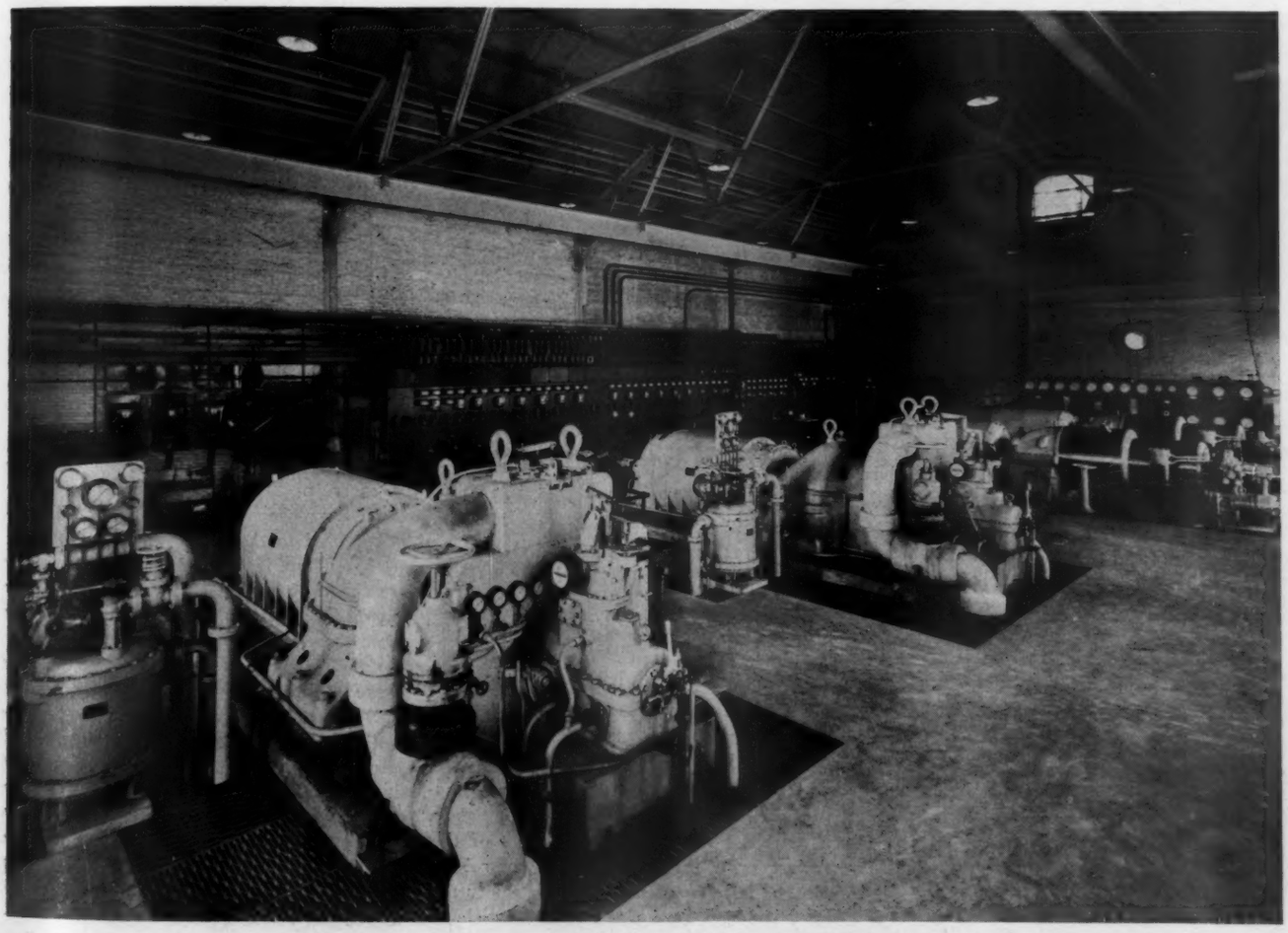
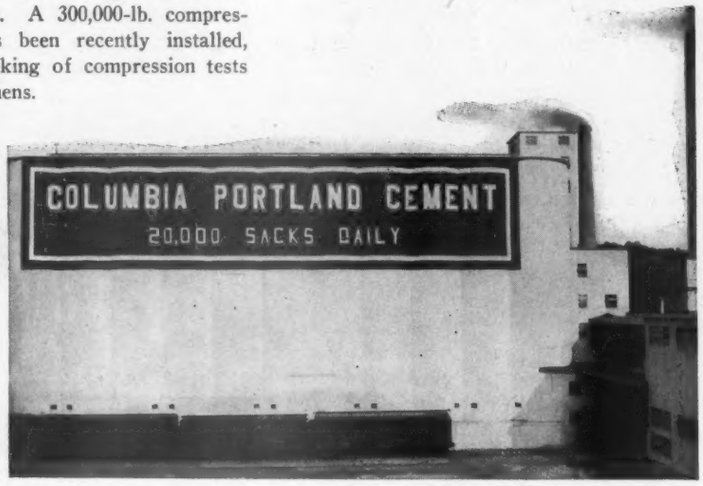


Fig. 19. Interior of power house. The new turbine generators are in the foreground, the old in the rear and the instrument board for boiler and kiln control at the farther wall

constructed of concrete and hollow tile and the original office building which housed both office and laboratory has been rearranged and entirely devoted to laboratory purposes, with every facility for making all chemical and physical tests. A 300,000-lb. compression machine has been recently installed, permitting the making of compression tests on job-size specimens.

The buildings for the cement plant proper are of structural steel with roofs and siding of Robertson asbestos protected metal; the power house, evaporator house, machine shop, storeroom, car repair shop, time office and hospital and laboratory are of brick, and the stock, pack and bag houses of reinforced concrete.



Pack house and loading tracks, Columbia Division, Pittsburgh Plate Glass Co., Fultonham, Ohio

The structural steel work was fabricated and erected by the Pittsburgh Bridge and Iron Works, who were also the steel contractors for the original plant.

All the concrete foundations and reinforced concrete structures were built by the Macdonald-Spencer Engineering Co. of New York City. Approximately 18,500 cu. yd. of concrete were poured in building the addition and auxiliary structures.

The heavy power piping was furnished and erected by the Power Piping Co. of Pittsburgh and the brick work for the boilers, flues and kiln linings was done by George Allen and Son of Cleveland.

Sly dust arresters were used for collection of dust in the new packhouse and baghouse.

The erection of the machinery and equipment was done by the company's own forces, who also handled all of the slurry piping and all steam and water piping except as mentioned above. The wiring and all other electrical work, including the switchboard, were handled entirely by the electrical corps of the plant.

H. A. Galt is vice-president of the company in charge of the company's plants at Barberton and Zanesville, which are known as the Columbia Division of the Pittsburgh Plate Glass Co., with Robert Parsons, superintendent at Zanesville, in active charge of the operation.

The writers prepared the plans for the addition and supervised its construction.

Samples of Glass Sand Show Proper Iron Content

CHEMISTS interested in glass sand analysis are offered a standard sample showing iron content being distributed by the Bureau of Standards, according to a statement just issued by the bureau.

The full text of the statement follows:

One of the essentials in the manufacture of glass is a supply of good glass sand, and one of the requirements of such a sand is a minimum iron content. Methods for the determination of such small amounts of iron as are found in glass sand are therefore most important and have been tested in connection with the standardization of the Bureau of Standards Standard Analyzed Sample of Glass Sand No. 81.

Unsuspected sources of error in some of the methods have been found and the reliance that can be placed on the percentages of iron obtained has been established.

These results will be of the greatest value to chemists interested in glass sand analysis. The standard sample is being distributed at cost, according to the usual procedure of the bureau. The price is $2 for 60 grams (a little over 2 oz.)

Whiting Manufacture in England

THE Cement Marketing Co., Ltd., London, Eng., takes exception to the statements regarding manufacture and sales of whiting in England published in Rock Products, November 12, 1927. The article in question was abstracted from the *Canadian Mining Journal* and appears to contain some facts which are somewhat misleading.

A letter from the company in correction of the above states in part:

"Although our principals are interested to a very considerable extent in the manufacture of whiting in this country (England), they are not the sole manufacturers of this product or cement, nor do we control all sales, as is reported in the article under notice. The reference made in the article to our control of sales is both incorrect and unauthorized."

Action of Sulphate Waters on Concrete

TESTS on concrete cylinders immersed in the sulphate waters of Medicine Lake, S. Dak., for periods up to three and one-half years have yielded considerable additional data to that contained in the report on the tests made at the end of one year's immersion *(Public Roads,* **6**, 28, 1925). These experiments were designed principally to aid in the general improvement of farm drain-tile and particularly to develop tile that will endure under the wide range of soil conditions peculiar to Minnesota. The results are applicable, however, to many other sections of the United States and to concrete culvert pipe subjected to the action of sulphate waters under conditions similar to those to which draintile are subjected.

A study of the data brings out several important facts which follow:

(1) Standard portland cements from different manufacturing plants vary greatly in resistance. This is evidenced by tests of more than 30 different cements after exposure for one year.

(2) All cylinders of high alumina cements made very satisfactory showings, up to and including three years' exposure, with the exception of the mortar cylinders of one high alumina cement and Ottawa sand mixed in the proportion of 1:5. These cylinders had almost completely failed at one year. On the other hand, the 1:5 high alumina cement concrete cylinders of another series had a strength of 122% of normal at one year and showed no visible disintegration. The natural inference is that high alumina cements, while more resistant than standard portland cements, are not of such high resistance as will permit of the use of extremely lean mixes for concrete subject to the action of sulphate waters.

Specimens cured in steam at a temperature of 212 deg. F. continue to make excellent showings in all series, and, without exception, cylinders so cured averaged stronger after three years in the lake than they did at one year.

(3) Cylinders cured in steam at a temperature of 212 deg. F. made equally favorable showings, irrespective of brand of cement used in the mix.

(4) There is slight difference between the specimens cured in steam at a temperature of 212 deg. F. and those cured at higher temperatures up to 285 deg.

(5) The results secured with admixtures were somewhat indefinite, as they were at the end of the first year, but they apparently indicate that certain admixtures, if properly handled, may have sufficient value in developing resistance to justify their use under special conditions. In this connection the cylinders were of greater average strength after two years in the lake than those in the lake or in the laboratory tank at one year. The general appearance of cylinders containing admixtures was excellent. —*Public Roads.*

State Highway Engineers Expect and Get Better Materials

Have Found Prices Not Much Different From Those in 1926—Majority Think Tendency Is Toward Better Portland Cement Rather Than Special Cements

OUR IMPRESSION that one outstanding development in the rock products industry in 1927 was the strenuous striving of progressive producers to compete on quality rather than on price is borne out by correspondence with state highway authorities in many states. Also this correspondence shows that state highway engineers, at least, have not lost the opportunity presented by present competitive conditions to specify higher grade materials than they have hitherto used. One unlooked-for result of this quality competition with some discriminating buyers is the dumping of a vast amount of inferior materials (that is, agregates) on the general building materials market at cut prices. Therefore, while our reports show price declines in all agregates, the price of quality aggregates, such as demanded by state highway departments, remained at approximately the same level as in 1926. This may mean that the state highway engineers are easier to educate to higher quality materials than the general building contractor, engineer or architect. But history shows that the latter will eventually be led to adopt quality materials if highway officials continue to demand them, because results will ultimately speak for themselves.

Was 1927 an Average Highway Building Year?

In view of the fact that a large share of prosperity of the rock products industry in 1927 may be attributed to road building activity, it is interesting to know whether this year may be considered an average or an exceptional year in this regard. We have the following views:

UNITED STATES — H. S. Fairbank, Highway Engineer, U. S. Bureau of Public Roads—On the basis of information available it would appear that highway construction during 1927 has been approximately equal in volume to that of the year preceding and there is no reason to expect a material increase or decrease in 1928.

ALABAMA—L. M. Dinsmore, Office Engineer, State Highway Department—The beginning of 1927 showed the expenditure of the last of our first bond issue for roads. However, in the spring an additional bond issue of $25,000,000 was approved. We now have approximately $12,000,000 invested in road and bridge contracts. This volume will be increased in 1928.

ARKANSAS—C. S. Christian, State Highway Engineer — By reason of our state road program this state in 1927 experienced an increased mileage of new construction; there will be a greater increase in 1928.

CALIFORNIA, C. S. Pope, Construction Engineer, State Department of Public Works—The year 1927 showed probably less work than should have been done because of delay in getting out the budget, which, in this state, operates over a biennial period beginning in the odd-numbered years. The year 1928 will probably show more construction in this state for the reason that the additional one-cent gasoline tax is available for new projects.

COLORADO—R. J. Randall, Office Engineer, State Highway Department—We consider, so far as this department is concerned, that the year 1927 has been below the average. More work will be done in 1928.

CONNECTICUT—J. A. Macdonald, State Highway Commissioner—The year 1927 compares very favorably with the three years, July 1, 1923, to June 30, 1926. The fiscal year, beginning July 1, 1927, and ending June 30, 1928, will probably be fully up to the previous year's volume.

DELAWARE—Samuel Knopf, Principal Assistant Engineer, State Highway Department—The year 1927 has been an average one. We expect to do as much construction in 1928.

KANSAS—W. V. Buck, State Highway Engineer—I think that construction in 1927 has been somewhat above the average and there is no question that we can expect more in 1928, unless we are hampered by lack of funds. At present we are attempting to secure an additional gasoline tax, and if we are successful, 1928 construction will be far in excess of 1927.

MAINE—Paul D. Sargent, Chief Engineer, State Highway Commission—The year 1927 has been about an average year so far as expenditures are concerned, but the mileage produced has not been quite as large as in former years, due to the fact that we are constructing quite a mileage of concrete pavement 27 ft. in width, as compared with 18 ft., our former standard width. We have at the same time built some 18-ft. concrete. We have also increased the thickness of our bituminous roads and now have 20 ft. as a minimum width for bituminous pavements. This has naturally lessened the mileage produced.

MASSACHUSETTS—A. W. Dean, Chief Engineer, Department of Public Works—Our 1927 construction has been larger than the previous year and we expect the year 1928 to be approximately the same.

MICHIGAN—V. R. Burton, Engineer of Research and Statistics, State Highway Department—The year 1927 has been an average highway construction year, and we expect the same amount of construction in 1928.

MISSOURI—T. H. Cutler, Chief Engineer, State Highway Department—The year 1927 Missouri completed the use of the $60,000,000 bond issue, under which we had been working; and our finances in the future will be on the pay-as-you-go basis, unless a new bond issue or some other method of financing is secured. There are several propositions of this kind talked of, but no bond money could be available before the middle of 1929. Our basic highway funds are received from automobile license fees, gasoline tax and federal aid, all of which give us approximately $10,000,000 a year for construction work.

NEBRASKA—R. L. Cochran, State Engineer — The year 1927 has been an average year for construction. However, due to awarding contracts considerably in excess of what will be accomplished this year, the contracts for 1928 will be about half of what they have been this year; but the amount of work performed should be about the same.

NEVADA—H. D. Mills, Office Engineer, State Department of Highways—Construction in 1927 has been on an average of previous years. New construction in 1928 will be somewhat less as we propose carrying on considerable work in widening present roadway and surface of previously constructed projects, this being necessary on account of the vast increase in travel during the last few years.

NORTH CAROLINA — L. R. Ames, State Highway Engineer—The year 1927 has been an average year for highway construction in this state; we have completed

1300 miles at a total cost of $24,000,000, which included $1,500,000 for bridges. As to our program for 1928, we will spend approximately $15,000,000, half of which will be spent for hard surface construction and half for other types.

NORTH DAKOTA—H. C. Frahm, Chief Engineer, State Highway Commission—An average year, 1927; expect 1928 to be the same.

OHIO—Robt. S. Beightler, Chief Engineer, Bureau of Construction, Department of Highways and Public Works—The year 1927 has been slightly below the average because of the failure of the Legislature to provide new funds for construction purposes until August 1. Construction in 1928 should be slightly in excess of 1927, but not as much as in years prior to 1927. This is due to some curtailment of highway funds by the Legislature.

OKLAHOMA—Clark Mandigo, State Highway Engineer—The year 1927 was an average year and we expect to do about the same amount of construction in 1928, as the funds available will be about the same as in 1927.

OREGON, N. M. Finkbiner, Engineer of Materials, State Highway Commission—Construction in 1927 was slightly less than in 1926. Construction in 1928 will be slightly less than 1927.

PENNSYLVANIA — Samuel Eckels, Chief Engineer, Department of Highways—The year 1927 was somewhat below the average in highway construction, due to a change in administration, resulting in a late start and the practical exhaustion of available bond issue funds. It is expected that 1928 will see about the same conditions, althought a program of approximately 700 miles of hard surfaced highway construction is expected.

RHODE ISLAND—C. H. Henderson, Chief Engineer, State Board of Public Roads—Insofar as we are concerned, 1927 has been an average highway construction year, and we expect 1928 also to be an average year.

SOUTH DAKOTA — J. Maughs Brown, Highway Engineer—The year 1927 has been an average highway construction year as far as the amount of work contracted for and let is concerned. but due to a very wet unseasonable spring, not as much total construction work was completed as in some other years. We expect about the same amount of construction in 1928.

SOUTH CAROLINA — Charles H. Moorefield, State Highway Engineer—The year 1927 was considerably above the average in highway construction. By the end of this year we will have let to contract more than 500 miles of pavement as compared with somewhat less than 400 miles, constructed prior to 1927.

TENNESSEE—R. H. Baker, Assistant Engineer, Department of Highways and Public Works—The year 1927 has been an average year, but due to several large contract lettings during the latter part of the year and to contemplated contract lettings during the early part of 1928, our construction for the year 1928 will probably exceed that for 1927 by between $4,000,000 and $7,000,000. Our actual contract construction work in 1927 will be approximately $9,000,000, while our contract lettings, very few projects of which will require a construction period of more than a year, will approximate $14,000,000. Our secondary improvement maintenance, and equipment costs for 1927 were approximately $5,500,000; but in 1928 these costs should be somewhat decreased, permitting more funds to go into higher type construction.

VERMONT—A. J. Runnels, Office Engineer, State Highway Board—The year 1927 was largest ever in this state; 1928 about the same.

VIRGINIA—Tazewell Ellett, Assistant Engineer—In 1927 we spent approximately $12,00,000; in 1928 we anticipate spending about $9,000,000.

WEST VIRGINIA—C. P. Fortney, Chairman, State Road Commission—The year 1927 was an average year; there will be less construction in 1928.

WISCONSIN—H. J. Knelling, State Highway Engineer — The year 1927 has been better than the average year; 1928 should be about the same.

WYOMING—Z. E. Levison, State Highway Engineer—Our construction program for 1928 will be approximately the same as for 1927, and therefore will be up to the average for the past several years. We do not contemplate any pavement construction next year, so that our requirements for cement will be confined to structures.

ONTARIO, CANADA—W. A. MacLuehle, Assistant Engineer, Department of Public Highways—Construction in 1927 on the Provincial highway system showed about 60% increase over 1926. In 1928 a slight increase in construction over 1927 is anticipated.

BRITISH COLUMBIA, CANADA—P. Philip, Deputy Minister and Public Works Engineer, Department of Public Works—The year 1927 has been an average year for construction.

Little Decline in Price of State Highway Materials

ALABAMA — Portland cement has dropped in price; sand, gravel and slag are practically the same as during 1926; prices f. o. b. plant at present are about as follows: Sand, 30c per ton; washed gravel, 80c to 90c; screened slag, 90c.

ARKANSAS—No decrease in the price of cement, sand, gravel or stone during the year, and no material decrease is expected during 1928.

CALIFORNIA—No decline of note in cement prices. Sand and gravel have varied in certain districts due to civil wars among producers. Present tendency in some districts for prices to build up again.

COLORADO—No declines noted.

CONNECTICUT—A decline in cement of about 20c per bbl.; sand, gravel and stone prices approximately the same as in 1926.

DELAWARE—Slight decline in cement, sand and stone, that affect the price of concrete by 75c to $1.25 per cu. yd. No further declines anticipated.

KANSAS—Failed to note any declines, and do not anticipate any in the immediate future.

MAINE—One or two recessions in price of cement during the year in an effort to meet foreign competition.

MASSACHUSETTS—Decline in price of cement noted; average contract price for concrete surfacing has decreased 7% from 1926 to 1927; from an average price of $10.52 in 1926 to $9.79 in 1927.

MICHIGAN—A decline in cement, but none in aggregates.

MISSOURI—Cement price decline averaged 5c per bbl.. Expect prices to be steady to slight decline in 1928. Aggregate prices have been steady with slight local declines during the latter part of the season. Look for steady prices or slight declines in 1928. Drop in consumption by the State Highway Department may justify some decline.

NEBRASKA — Sand-gravel products, which are the materials used by this department, have carried about the same prices this year as in previous years. Same is true of cement.

NEVADA—Have noted a slight decline in prices of cement and concrete aggregates.

NORTH DAKOTA—No declines in price noted.

OHIO—Have not noted a decline in prices of materials and do not look for any particular decline in 1928.

OKLAHOMA—Prices are practically the same as they have been for the past two or three years.

OREGON—No noticeable declines.

PENNSYLVANIA—Have not noted any general decline in prices of cement, sand, gravel, stone and slag.

RHODE ISLAND—There has been a decline in the bid price on concrete pavement in place, which probably is a reflection of the decline in the prices of cement and aggregate.

SOUTH DAKOTA—Have not noted a decline in prices of cement and aggregate. Our state cement plant serves to stabilize the price of cement in this state.

SOUTH CAROLINA—Noted a material decline in price of cement but none in prices of aggregate. The decline in the price of cement averages about 50c per bbl. for the state.

TENNESSEE—Have not noted a decline in price of aggregate; a slight decline in price of cement in the spring of 1927.

VERMONT—Verry little more decline looked for, as bid prices are now at rock bottom.

VIRGINIA—Have noticed a decline in cement prices in specific instances; would not be surprised to see a slight further decline.

WEST VIRGINIA—No declines noted.

WISCONSIN—Have noted a decline of cement and aggregate.

ONTARIO—Prices the same on cement and aggregate as in 1926. Expect they will remain stationary in 1928.

BRITISH COLUMBIA—Prices have been stationary.

Better Materials Have Been the Rule

UNITED STATES—Believe that the increase in tensile strength requirements for portland cement has resulted in a better product, especially in those mills which were running close to the line on the old specifications.

ARKANSAS—We have noted an effort on the part of producers to make better cement, also better aggregates, during this year.

CALIFORNIA—All of the companies in California are improving their cement until there is, at the present time, little difference in the quality furnished by the various companies. We believe this is largely due to studies made by our construction department, which showed that there was a very great difference in the character of the cements formerly manufactured, in spite of the fact that they all passed the standard of specifications of the A. S. T. M. As to aggregates the producers in California are all on a high plane with regard to the character of the materials they furnish. It is possible to secure almost any grading of material which we desire through co-operation with the producers.

COLORADO—We believe manufacturers are making an effort to produce better cement and aggregates.

CONNECTICUT—Without doubt there has been more co-operation on the part of commercial producers of sand and stone to comply with specifications than in the past. It might also be said that the quality of cement now manufactured is in most cases superior to the product turned out a few years ago.

DELAWARE—We believe that there has been better cement and aggregates this year because of the increase in the pressure of competition.

KANSAS—There seems to be a desire among material men to improve the quality of their products—this being especially noticeable in the cement industry.

MAINE—We have not noticed any particular betterment in cement or aggregate.

MASSACHUSETTS—We are always looking for the best cement and aggregate, and each year we are looking for stronger concrete than the year previous.

MICHIGAN—We have noticed a striving for better cement and a less marked effort for better aggregate.

MISSOURI—Cement quality has been more uniform with considerable improvement on the part of plants formerly somewhat below the average in strengths developed. Average strengths developed for the season are somewhat lower than for the preceding season. In this connection it must be noted, however, that cement from this district has averaged considerably above specification requirements. Aggregates continue to show a gradual improvement from season to season.

NEBRASKA—The quality of cement has been satisfactory.

NORTH DAKOTA—Some effort to make better cement and aggregates.

OHIO—Have noticed that the cement companies are producing better cement than in previous years, due particularly to more rigid specifications. More care in the grading of aggregates has also been noticed in our laboratory reports on materials.

OKLAHOMA—We have not noticed any particular difference in the quality of cement used. We believe there has been a betterment in the aggregate, due to increased pressure of competition.

OREGON—No noticeable improvement.

PENNSYLVANIA—There seems to be an effort to produce better cement due to close inspection and insistence upon a uniformly good product.

RHODE ISLAND—We believe there has been a general striving to make better cement concrete, due to the fact that strength tests are showing up poor concrete.

SOUTH DAKOTA—Our cement is, if anything, getting better. Our aggregates are running along about the same as they have been.

SOUTH CAROLINA—Noted some improvement in the quality of cement, as shown by laboratory tests, and during the year we have raised our specification requirements.

TENNESSEE—We find that a larger number of aggregate producers are improving the quality of their products by various up-to-date methods, crushed stone producers are installing washing equipment and paying more attention to gradation; gravel producers are installing segregation units as well as more efficient washing equipment, and thereby find it possible to meet any gradation specifications with clean materials.

WEST VIRGINIA—We have had less trouble on the score of quality, which may be attributable to better products.

WISCONSIN—Have noted a striving to make better cement and aggregates.

ONTARIO—Noted improvement, due slightly perhaps to increasing pressure of competition, but much more to closer inspection and more experienced contractors on construction.

BRITISH COLUMBIA—Note striving for better products, but not necessarily because of competition, perhaps because of trend toward higher quality demanded in concrete construction today. More knowledge, the result of tests and experiment over the last few years, has been gained, and requirements are consequently of high standard. No one will accept poor aggregate or cement now.

Quick-Hardening Cements—What Are Their Functions?

UNITED STATES—We believe special quick-hardening cements and so-called super cements should be recognized by special specifications, and that no attempt should be made to cover them in specifications for portland cement.

ARKANSAS—As quick-hardening cements or super-cements are, by their prices, excluded from anything except emergency work, it is believed that they should not be recognized by special specifications; but we think their manufacture has tended, and is now tending, toward the improvement in quality of all portland cements.

CALIFORNIA—The state permits the use of quick-hardening cements, but we find that we can obtain satisfactory results by using more of the standard cements per cubic yard of concrete. The pressure of short-time curing is not so important in most of our work as in some of the metropolitan districts in the East.

COLORADO—We do not recognize quick-hardening or super-cements in our specifications. We believe they may tend to improve standard cements.

CONNECTICUT—Believe they should be recognized by special specifications since it is not possible for all companies to make a quick-hardening cement. In most cases the chemical composition of these cements is slightly different from ordinary portland cement and they cost more to produce. Their use in many cases is justified from an economical standpoint.

DELAWARE—We believe quick-hardening and super-cements should be recognized by special specifications only.

KANSAS—Do not believe that quick-hardening cements should be recognized by special specifications. However, I do believe that these cements have been the cause of the increase in quality of cement in this particular vicinity.

MAINE—Undoubtedly the manufacture of quick-hardening and super-cements will have an influence tending to improve the quality of old cements. I believe that in ordinary work much better results would be produced if we would extend the mixing time for standard portland cement concrete

to about two minutes, having in mind, of course, a proper control of all the elements which go to make up the concrete.

MASSACHUSETTS — Believe quick-hardening and special cements will serve best to improve all portland cement.

MICHIGAN—We believe that so-called super-cements will better serve by tending to improve the quality of all portland cement.

MISSOURI—We believe there is a field for high early strength cements and a rapidly increasing demand for a shorter curing period for concrete. Several agencies are working toward the solution of the problems involved, but the final outcome is not yet apparent. In the highway field considerable progress has been made toward the utilization of special mixes, and if gains in strength previously noted should continue to develop, manipulations of mixes would probably obtain the early strengths desired. Such manipulations are at present, however, only safe for users who have technical advice and testing facilities necessary to insure satisfactory results. Other users will probably furnish a market for special cements, pending possible developments in the normal cement field. It is possible and probable that the economical limit for the increase of cement strengths, under present methods of attack, is about reached. The field of improvement through selective composition is barely touched, however, as witness the indications suggested through the medium of the research work now being carried on co-operatively by the Portland Cement Association and the Bureau of Standards. We are going through a period of development and the final answer will depend on the degree of development. If normal cement can economically take care of the new needs of the consumer, there will be no field for the higher priced special products. The consumer is being educated to the new service rendered by early strength and will demand this service from the most economical source. If the normal product does not furnish the service, special products will fill the need at an added cost.

NEBRASKA — We are interested in quick-hardening cement, however, for probably a very limited use. We have not been entirely satisfied with results obtained and prices charged to date. However, there seems to be a development along this line. It is our opinion that special specifications should govern.

NEVADA—It is impossible to overlook the use of quick-hardening cements, as the public is demanding more and more the abandoning of detours made necessary when laying concrete pavement, that must necessarily be cured for a period of 21 days before being thrown open to travel. In some instances special specifications might be needed, but we believe the cement companies will see the necessity for this type of cement and will gradually improve this quality in all cements.

NORTH DAKOTA—We believe quick-hardening and super-cements are tending to improve the quality of portland cement.

OHIO—We use no quick-hardening or super-cement in pavement construction.

OKLAHOMA—We believe the quick-hardening or so-called super-cements should be recognized by special specifications.

OREGON — Special specifications for special problems.

PENNSYLVANIA — Quick-hardening cements will probably result in additional specifications. At present there are not sufficient data available for the formulation of such specifications.

RHODE ISLAND—Quick-hardening and so-called super-cements should be recognized by special specifications.

SOUTH DAKOTA — Favor admitting the quick-hardening and so-called super-cements under the same chemical specifications, with possibly some changes; but I cannot see why the ordinary strength tests for early periods should apply. New specifications should be written for early strength tests.

SOUTH CAROLINA — We have not recognized quick-hardening cement by a special specification except for short sections of road where early strength concrete was desired for convenience of traffic. We have under consideration revising our specification for concrete so as to require a specified strength at a given age, rather than fixing definitely the proportions of ingredients as we do at present.

TENNESSEE — Our use limited; not prepared to express an opinion as to the benefit of future recognition of these special cements by special specifications.

VERMONT—Not special specifications; at present quick-hardening cements will better serve to improve the quality of all cement.

VIRGINIA—We believe that the quick-hardening cements and so-called "super" cements should be recognized by special specification, or at least a provision governing their use.

WEST VIRGINIA—Believe special cements should be recognized by special specifications.

WISCONSIN—Would recognize special cements with special specifications.

ONTARIO—Have not favored special specifications, considering quick-hardening and so-called super-cements will serve better in tending to improve the quality of all portland cement.

BRITISH COLUMBIA—Should recognize special cements by special specifications—as long as the price is different. Ordinary cement is expensive and no advantage other than speed is noted from the use of quick-hardening cement. Its use is purely a question of economics.

Present Specifications for Portland Cement Adequate?

UNITED STATES—Although the present specifications for portland cement are not all that might be desired, we do not believe that any of the requirements should be raised until either the technique of testing involved in the present methods has been improved, or new methods have been devised, which will insure more concordant results than are at present possible.

ARKANSAS—We do not think present specifications for portland cement are adequate.

CALIFORNIA—We believe that present specifications are probably behind the progress which has been made in the manufacture of portland cement. Within a short time, we believe, the specifications should be amended so that there will be available a specification representative of present practice and quality.

COLORADO—We believe present specifications are adequate.

DELAWARE—Regular specifications for portland cement are not adequate, and more attention should be paid to insurance of fine grinding in order to produce stronger cement. We call for 250 lb. in 7-day and 350 lb. in 28-day tests—both are above A. S. T. M. standards.

KANSAS—Due to the unsettled condition of the cement industry in which each plant is trying to produce somewhat better cement than the other, I would not be in favor of increasing our specification requirements on cement, until such time as the industry is somewhat more settled, and a more uniform material is secured by all the manufacturers.

MAINE—Present specifications are adequate.

MASSACHUSETTS—The present specifications, in general, are adequate.

MICHIGAN—Do not consider the present specifications adequate.

MISSOURI—Specifications will always need to keep pace with progress. As a manufacturing industry makes generally and economically available a better product, both the consumer and producer need an advanced specification for protection against the lagging producer. The producers should be the first to insist upon up-to-date specifications, rather than the last, as has sometimes been the case. Our present specifications are probably adequate as to the limits prescribed, but are by no means perfect as to methods of test, or as to the development and interpretation of information regarding the product.

NEBRASKA—Present specifications are adequate.

NEVADA — Believe specifications are adequate.

NORTH CAROLINA — We recognize the specifications of the American Association of State Highway Officials and think these specifications are adequate.

NORTH DAKOTA—Specifications are adequate.

OREGON—Considering present knowledge of portland cement can offer no suggestions for improvement of present specifications.

PENNSYLVANIA—The present specifications for portland cement are not adequate. We expect further requirements on chemical composition and a more accurate method for determining soundness.

RHODE ISLAND — Present specifications appear adequate.

SOUTH DAKOTA — Specifications are adequate.

SOUTH CAROLINA—Specifications for portland cement properly contemplate the best average product that the mills can produce in large quantities. It is our idea to raise the requirements of our specifications whenever this appears advantageous to the department's work. We do not have in mind, however, restricting competition unduly.

TENNESSEE—Present specifications for portland cement result in cement which we believe is satisfactory for the work required of it. Accelerated tests do not determine the results shown by years of actual service. We therefore believe our present specifications are adequate.

VERMONT—Present specifications are adequate.

VIRGINIA—We believe our present specifications for portland cement are adequate though we are making continuous investigations in our laboratory and expect to make changes we think necessary.

WEST VIRGINIA — Specifications are adequate.

WISCONSIN—Specifications adequate.

ONTARIO — Present specifications are adequate.

BRITISH COLUMBIA—Manufacturers usually exceed present specifications.

Is It Possible to Place Relative Values on Various Cements and Aggregates?

UNITED STATES—We do not believe there are sufficient data available to warrant distinguishing between various types of aggregates as such, for use in concrete construction. Enough work has been done, however, to indicate that it may be possible eventually to establish such relative values.

ARKANSAS—Because of the great variety of the various qualities of all aggregates we do not think sufficient experiments, nor experience, exists to render it possible at this time to place a value on them in strict conformity to their real worth.

CALIFORNIA —,There are, we think sufficient tests, experiments and experience to make it possible to place relative values on various cements and aggregates. Too often we find such discussions as to the relative value of crushed stone vs. gravel for concrete to be clouded by the lack of understanding that it is not possible to secure as dense a grading with crushed stone as with screened gravel, and for that reason, the relative proportion of cement available in any cubic yard would be greater with gravel than with stone, at no increased cost. We have considerable data of our own on these subjects.

COLORADO — We do think existing tests and experiments and experience make it possible to place relative values on cement of various qualities and on concrete aggregates.

CONNECTICUT — Results obtained with various cements and with aggregates have shown conclusively the relative merits of the various products. However, costs and the requirements of the finished product should be considered in the selection of the cement and the aggregate to be used.

DELAWARE — Experience has shown we can place relative values on cement and on aggregates.

KANSAS—Not in favor of attempting to place relative values on aggregates.

MASSACHUSETTS—We have no tests at the present time which would show crushed stone aggregate superior to screened gravel. We have roads built with screened gravel aggregate over ten years old which are in very good shape, so it would appear that we must look to a longer period than ten years to show any superiority of stone over screened gravel.

MICHIGAN—There are a good many different varieties of crushed stone and a good many varieties of gravel. There is no question that a hard, crushed trap rock will give a very superior concrete, and it is equally unquestioned that a soft, dusty limestone is absolutely unsuited for use. In the same way gravels containing a large percentage of hard stone produce excellent concrete. On the other hand gravels containing large percentages of soft limestone and shale will not make good concrete. There is also the difficulty of deciding on exactly what we term a gravel or a crushed rock. In many cases commercial producers of gravel crush a large percentage of their product so that the percentage of crushed rock in the aggregate runs high. In other cases there is practically no crushed material in the aggregate. At what point should we say the aggregate is gravel or crushed rock?

MISSOURI — Experimental work recently completed or now under way promises to give considerable information as to the relative value of various ingredients of concrete, but we do not believe that we are ready for quantitative comparisons to any great extent. The economic factors entering into such comparisons will always be important when any large territory is under consideration.

NEBRASKA—Perhaps to a limited degree it is possible to place relative values on different cements and aggregates.

NEVADA—We believe that there is always room for improvement in making tests or experiments, but the present methods in use give a fair idea of the relative value of cement of various manufacturers and of crushed stone vs. slag or gravel for concrete.

NORTH CAROLINA — Do not think that our experience and experiments make it possible to place relative values on concrete aggregates, especially crushed stone vs. gravel. Our standard specifications require a mix of 1:1½:3 when gravel is used as against a 1:2:4 mix when crushed stone is used.

NORTH DAKOTA—Present tests and experiments permit valuing different cements; aggregates, no.

OHIO—Present tests, experiments and experience do not make it possible to establish relative values for cement and aggregates.

OREGON—Yes, in the case of cement; probably yes in the case of aggregates.

PENNSYLVANIA—Believe that existing tests and experiments and experience make it possible to place relative values on concrete of various aggregates, but do not think this is true in the case of various portland cements.

RHODE ISLAND—We do not believe that existing tests make it possible to place relative values on concrete aggregates, but our tests show that higher strengths go hand in hand with higher test cements, other things being equal.

SOUTH DAKOTA—One of the main troubles with our methods of cement testing today is that different operators are not getting the same test results on identical samples of cement, which, nevertheless, when tested in the usual way by experienced testers are very satisfactory. I hardly consider test methods fine enough, or scientific enough, to be of much value in placing relative merits on different brands of cement, with the possible exception of strength. The main value of present tests is to keep the cement up to a usable quality. There are so many things involved when you begin to consider the relative merits of crushed stone vs. slag or gravel that it is impossible to make a general comparison. Crushed stone varies so much in itself, and so does gravel or slag, that it seems a general comparison would not mean much.

SOUTH CAROLINA—I do not believe existing test results or the results of experience are sufficient to warrant very definite values being placed on cement of various qualities or on different qualities of aggregates at the present time. It is probable, however, that some advantage might be realized by extending quality control

within the limits of our present specifications. What I have in mind is that we may come to specifying definite physical qualities for concrete and permit the constructor to consider economy in selecting and proportioning the various materials of which it is composed.

TENNESSEE — Our tests and experiments have not been conducive to conclusions which will make it possible for us to place relative values on cements of various qualities or on one type of aggregate against another. We are conducting a number of interesting investigations which, at some future date, may be of value in the determination of the best qualities of cement and aggregates.

VERMONT—Tests show a decided difference in various brands of cement, and the early opening of concrete roads is very much affected. There is considerable difference in results from local stone and crushed aggregate of trap rock.

WEST VIRGINIA—Price, and the purpose for which cement and aggregates are intended to serve, will be the determining factors.

WISCONSIN — It is possible now to place relative values on various cements and aggregates.

ONTARIO — We have found crushed stone, when proper care is taken in the selection of the stone, and gravel, when properly screened and washed (which condition we always insist on) give equally satisfactory concrete.

BRITISH COLUMBIA — Not possible to compare aggregates; the aggregates are always stronger than the cement binder.

Conclusions

From the foregoing it is obvious that representative large users of portland cement and aggregates are much at sea regarding probable developments as are the manufacturers. But those who have given the problems the most thought evidently agree that the most desirable quality of these new cements is early high strength in the finished concrete. But this, as T. H. Cutler, chief engineer of the Missouri State Highway Department, has explained in some detail, is not necessarily a quality in the cement alone, but may be brought about by manipulation of the mix, or in some other way, with present standard portland cements. As regards the relative value of various cements, there is apparently a general belief that it is, or will be, possible to make quantitative comparisons, but such comparisons will always be complicated by economic considerations entirely aside from the quality of the cement itself. In the case of aggregates there is ample evidence of a demand for better prepared aggregates than ever before, which should work to the advantage of up-to-date commercial producers. So far as comparing the relative values of various kinds of aggregates is concerned, the general opinion is just exactly what any thinking producer is capable of seeing for himself—that there is as much or more difference between one gravel and another, as there is between gravel and crushed stone, generally, or vice-versa, just as much or more difference between one crushed stone and another as between crushed stone and gravel generally.

Producers have been, apparently, quite successful in helping to educate state highway authorities to the advantages of clean, well graded agregates. They may now turn with some degree of safety to other purchasers, who are absorbing great quantities of aggregate that would be rejected for state highways, at cut prices, which in the long run are bound to have a tendency to lower prices for highway material. The producer will then be in the sad predicament of having raised the quality of his product at considerably increased cost of manufacture, to sell it at a lower price than he formerly got for a less carefully prepared product. Competition on a quality basis is preferable to competition on a cut-price basis, but not unless prices commensurate with quality can be maintained.

Chemical Problems Awaiting Solution by Highway Engineers*

CHARLES M. UPHAM, director of the Highway Research Board, Washington, D. C., recently made some interesting remarks about the application of chemistry to highway construction. Following are some excerpts:

Although the highway industry has made great strides because of the chemically prepared materials furnished by the chemical engineer, and although the development has extended over a long period, the chemical engineer in the highway industry will be remembered for what he is going to do rather than what he has already done. Beyond the preparation of materials the chemical engineer has taken little active part in road construction and probably his is one of the reasons why no greater advance has been made. Up to the present time most of the research that has been undertaken has been physical.

The highway industry should be truly grateful for portland cement as manufactured today, still there is much work left for the chemist on this product. The development of a high early-strength cement at a reasonable expense will overcome many of the present difficulties in the use of concrete in the highways.

The Great Clay Problem

Five hundred thousand miles of primary roads of the country are fast being covered by pavements that can meet the demands of present-day traffic, but they are being constructed and maintained at great cost. Besides this primary system nearly 3,000,000 miles of road are left to be improved. The traffic on this large mileage of unimproved road does not justify the construction of expensive pavements such as are being laid on the primary routes. Therefore a low-cost pavement that will satisfactorily take care of a reasonable amount of traffic must be provided. Already considerable work has been done. Physical research has been undertaken. The Highway Research Board has a committee working on this problem continuously, but progress reports indicate that the maximum progress at this time is the development of a road made of suitable local natural material protected with some bituminous binder. In some places local material is satisfactory for road construction but usually the preponderance of clays make the material unfit for any suitable road use.

One of the most deleterious materials of road construction is clay, especially when in excessive quantities. Clay lends itself to many classifications but because it is highly absorptive and difficult to drain, and of low bearing value when wet, it is one of the expensive and difficult factors in road construction. Certain clays up to 15 or 20% in a roadway can be handled satisfactorily, but frequently the percentage of clay greatly exceeds this figure and in such places it is difficult to construct a low-cost or standard-type pavement.

The chemist can render no greater service than to discover a method for treating clay in such a way as to make it more nearly resemble the sands. It is very desirable to change its nature so that it can be drained, and reduce to a minimum the volumetric changes when subjected to various amounts of moisture and increase the bearing value under moist condition, thus making it into a material that can be shaped and maintained by road machines.

Such a discovery would be welcomed by all states in the Union and could immediately be utilized on that large mileage of unimproved roads which must take care of a large percentage of our present-day traffic and which in a very short time will serve as primary roads of the country. Such a discovery would almost immediately create savings that would amount into the millions of dollars and thereby change the whole art of road building.

*From a paper "Highway Construction," read at the 74th meeting of the American Chemical Society, Detroit, Mich., September 5-10, 1927.—*Industrial and Engineering Chemistry*, October, 1927.

Southern Builders Supply Men Will Meet at New Orleans

IT has recently been announced that the Southern Builders Supply Association will hold their ninth annual convention at the Roosevelt Hotel in New Orleans on January 16 and 17. The convention will bring together building supply dealers from 13 states of the south.

Cement, Lime, Gypsum and Stone at the Bureau of Standards in 1927*

Review of Research Work and Developments

FOLLOWING an annual practice of several years standing ROCK PRODUCTS presents a summary of work accomplished and in progress for the rock products industry at the Bureau of Standards, U. S. Department of Commerce:

Control of fabricating and curing conditions for concrete and cement testing —Due to the influence of temperature and humidity on the strength of mortar and concrete test specimens during fabrication and storage it is necessary to control the fabricating and storage conditions. An automatically controlled cabinet has been built and placed in operation at the Bureau for the storage at 70 deg. F. and as high a humidity as practical, of cement and mortar test specimens for the first 24 hours after molding. An apparatus patterned after the Beaver control operates a commercial type electrical refrigerating unit and a nichrome heating element, placing each in circuit when needed. Water is constantly circulated within the cabinet, being fed from the circulating pump through pipes to the top of the box, from which it flows down fine mesh screens to the sump formed by the bottom of the box. The air within the cabinet is also circulated, and wet and dry bulb recording thermometers make continuous records for temperature and humidity. The operation of the apparatus is satisfactory.

Equipment has also been installed to maintain constant temperature in the concrete mixing laboratory and in the damp storage room for curing concrete test specimens. In the future the concrete materials will be at 70 deg. F. when used and the specimens will be made and aged in the molds for 24 hours at this temperature. The damp storage room will also be maintained at this temperature.

Proportioning and grading of aggregates for concrete — The increase in allowable working stresses, and the rapidity of construction procedure make it important that the concrete placed in a structure be of the design strength. It is also very desirable that the strength to be developed by a given aggregate in any proportion may be known within reasonable limits either from seven-day or shorter age tests, or simply from the grading and other characteristics of the aggregates. An extensive study has been made of the effects of different cements, different types of aggregates, proportions of materials, gradation of coarser aggregates, the ratio of fine to coarse aggregate, on the strength of concrete; also the relation of the earlier strengths of concrete to the 28-day and later age strengths. The results of these tests are being tabulated and analyzed. Several points of interest have been established. It was observed that, for the same amounts of water and cement, and the same proportion and quantities of aggregate, some of the cements produced a concrete of relatively greater workability than others. The relative normal consistency of the cements did not account for the difference in workability of the concrete. The workability was judged both by the laboratory mixers and by the operator who rodded the concrete into the molds.

The tests indicate that the strengths of the concretes made of the several cements used at ages up to and including 28 days vary considerably, but at six months and one year (beyond which age the tests have not been carried) the strengths are more nearly equal for the several cements. The tests also indicate the desirability of using a ratio for fine to coarse aggregate between 1 to 1 and 1 to 2, in order to obtain maximum strength and workability, preferably nearer the higher ratio in the case of coarse aggregates deficient in the smaller sizes.

Durability of concrete aggregates— One of the most important of the properties of concrete aggregates, which up to the present time has been subject to the least experimental investigation, is the durability of the aggregate before making into concrete. The direct method of determining the durability of the aggregate by freezing and thawing cycles is long and tedious. To obtain a quicker test two accelerated weathering tests have been developed—the sodium sulphate and the sodium chloride tests. The Bureau has undertaken an investigation of these accelerated weathering tests to determine whether they have any relation to the freezing and thawing test. From some information available it seemed desirable to add another form of accelerated test—boiling and drying. The tests are all now in progress and although most of the aggregates are sound and durable, some have disintegrated.

The workability of cement pastes and concrete mixtures — Means of measuring the workability of cement pastes and concrete mixtures have been experimentally studied during the year. To date there has been no acceptable method of measuring the workability of a mix other than by the judgment of a skilled operator. Those hitherto employed—the slump cone, the flow table, the penetration test—are all satisfactory to a certain degree, but two mixes giving the same measurement on these machines may have different workabilities as judged by skilled operators. A new apparatus has been developed in conjunction with the Celite Products Co.'s associateship at the Bureau consisting of a flexible hollow metal cylinder, which when filled with the concrete whose workability is to be measured, is compacted by a number of impacts on the flow table, and then compressed in the direction perpendicular to the axis. The apparatus is as yet in the experimental stage, but test results from it show less variation in measured values than with the apparatus previously used.

Standard methods of physical tests for cements—An investigation of the volumetric changes of portland cement after mixing, with the object of comparing these changes with the soundness of cement, has been concluded. The measured volume changes for 32 brands of cement ranged from almost nothing to an expansion of 0.061%, using the correct amount of water for normal consistency as now accepted, and also using 42% of water by weight of dry cement. The usual soundness test requirements were met by all of these cements. The problem of developing more satisfactory physical tests for the acceptance of portland cement is being studied. The present tests, especially for tensile strength, do not appear to be correlated with the relative strengths that these same cements will develop in a concrete and it is desirable to develop a simple test to obtain this correlation.

Constitution of portland cement—In addition to the studies of cement conducted in co-operation with the Portland Cement Association, work has been conducted on the study of the heat of reaction of portland cement with water and on studies of the hydration of the aluminates of lime. Sufficient data were obtained to indicate that the interesting feature of the reaction will be in the first twelve hours and it appears that much simpler equipment can be used and at least relative values obtained. This is now being done.

Former investigations have shown that lime can combine with alumina only in the molecular proportions: $3CaO.5Al_2O_3$, CaO.

*Publication approved by the Director of the Bureau of Standards of the U. S. Department of Commerce.

Al_2O_3, $5CaO{\cdot}3Al_2O_3$, $3CaO{\cdot}Al_2O_3$. Tricalcium aluminate appears to be the only aluminate present in portland cement of normal composition and normal properties. The monocalcium aluminate and the 3:5 calcium aluminate occur in cements characterized by a high alumina content.

An investigation has been undertaken to obtain more information on the mechanism of the reaction of water on the calcium aluminates. Some preliminary experiments had indicated that the cementing qualities of the calcium aluminates and high alumina cement might be closely related to their reaction with water in the formation of metastable and supersaturated solutions of calcium aluminates. It was decided, therefore, to study not only the chemical composition and pH of these solutions as they were formed in the early periods of the setting process, but also to follow the changes which they underwent in passing from a metastable condition to one of equilibrium. Since the addition of water to freshly prepared tricalcium aluminate, $3CaO{\cdot}Al_2O_3$, produces a very vigorous reaction, the changes in composition of the resulting solutions could not be followed in the case of this aluminate. Previous investigations have indicated that its setting is due to the formation of hydrated tricalcium aluminate.

It was surprising to find that the other anhydrous calcium aluminates and a high alumina cement, differing so widely in chemical composition, reacted with water in the early periods of the setting processes to form calcium aluminate solutions with the molar ratio of CaO/Al_2O_3 in each case very close to 1.0. The concentration of this monocalcium aluminate solution increased with time until a maximum was reached. Part of the lime and alumina precipitated from these metastable solutions, at first rapidly, and then more slowly as time went on. At the later periods the molar ratio of CaO/Al_2O_3 remaining in solution had increased with an increase in the pH.

Chemical analysis and petrographic examination of the material precipitated from the metastable solutions indicated that hydrated alumina and hydrated tricalcium aluminate were precipitated as equilibrium was approached. Calculations based upon electrometric measurements indicate that the aluminate in solution is the calcium salt of monobasic aluminic acid.

It would appear that the cementing properties of the monocalcium aluminate, the 3:5 aluminate, the 5:3 aluminate, and the high alumina cement studied were in part due to the precipitation of hydrated alumina and crystalline hydrated tricalcium aluminate from a metastable and supersaturated monocalcium aluminate solution.

Publications—"Why Aging Is a Factor in the Study and Use of Cements," P. H. Bates, Proc. Amer. Conc. Inst., 1927.

"The Present Status of Portland Cement and the Possibilities of 'Super' Cements," P. H. Bates, *Zement*, 16 (1927), page 753.

"Long Time Tests of High Magnesia Portland Cement," P. H. Bates, Proc. Amer. Soc. Test. Mtls. (1927).

"Studies on the System CaO-Fe_2O_3-SiO_2," by Hansen and Bogue, Jour. Amer. Chem. Soc., 48 (1926), 1261.—Paper No. 1 of the Portland Cement Association Fellowship.

"The Determination of Uncombined Lime in Portland Cement," by Lerch and Bogue, Ind. Eng. Chem., 18 (1926), 739.—Paper No. 2 of the Portland Cement Association Fellowship.

"A Digest of the Literature on the Constitution of Portland Cement Clinker," by Bogue, *Concrete*, July, 1926, to February, 1927.—Paper No. 3 of the Portland Cement Association Fellowship.

"Portland Cement Research" by Bogue, Proc. A. S. T. M., 26, Part II (1926).—Paper No. 4 of the Portland Cement Association Fellowship.

"The Preparation and Optical Properties of Calcium Hydroxide Crystals," by Ashton and Wilson, Amer. Jour. Sci., 13 (1927), 209.—Paper No. 5 of the Portland Cement Association Fellowship.

"Studies on the System CaO-Al_2O_3-SiO_2. The Composition $8CaO + Al_2O_3 + 2SiO_2$," by Hansen, Dyckerhoff, Ashton and Bogue. Jour. Phys. Chem., 31 (1927), 607. *Zement*, 16 (1927), 51. *Rock Products*, April 16 (1927).—Paper No. 6 of the Portland Cement Association Fellowship.

"The Preparation of Optically Clear Selenium for Use in Index Media," by Brownmiller, Amer. Mineralogist, 12 (1927), 43.—Paper No. 7 of the Portland Cement Association Fellowship.

"X-ray Diffraction Measurements on Some of the Pure Compounds Concerned in the Study of Portland Cement," by Harrington, Amer. Jour. Sci., 13 (1927), 467.—Paper No. 8 of the Portland Cement Association Fellowship.

"Portland Cement in Concrete Engineering," by Bogue, Proc. Amer. Conc. Inst., 23 (1927), 355. *Concrete*, 30 (1927), 33.—Paper No. 9 of the Portland Cement Association Fellowship.

"Preliminary Investigation on the Combination of Lime in Portland Cement Compounds," by Hansen and Bogue, Ind. Eng. Chem., 19 (1927).—Paper No. 10 of the Portland Cement Association Fellowship.

"Studies on the Hydrolysis of Compounds Which May Occur in Portland Cement," by Lerch and Bogue, Jour. Phys. Chem., 31 (1927).—Paper No. 11 of the Portland Cement Association Fellowship.

Terra cotta wall investigation—In cooperation with the National Terra Cotta Society, the bureau is conducting an investigation of methods of attaching architectural terra cotta to concrete and brick masonry. Present methods differ widely and no comprehensive study has been made to determine the most suitable practice. In some localities metal ties and fixtures alone are used to support terra cotta, while in others the additional support of some form of masonry bond is thought essential. In this investigation the resistance of different types of construction to loads is being determined.

Walls representing some of the types of construction used commercially were built in the laboratory and subjected to certain conditions of loading which may occur in buildings. As the loads were applied observations were made of the displacement of the terra cotta and of the deformations and cracking of the walls. In the tests the facings anchored by both metal ties and by a masonry bond resisted greater loads than those anchored by metal fixtures alone. The comparatively rigid attachment afforded by a masonry bond did not appear to be an objectionable feature as might have been supposed, even when the backing walls were subjected to loads much greater than would be expected in building.

Experimental concrete mine stoppings—The Bureau of Standards co-operating with the Bureau of Mines conducted an investigation of the resistance of concrete mine stoppings to pressures suddenly produced by explosions. Stoppings are built in mines to prevent flames and other destructive effects of explosions from spreading throughout and for sealing abandoned galleries. Data on the effects of explosive pressures were obtained by testing twelve experimental stoppings.

An explosion chamber of concrete, heavily reinforced, was constructed as part of the test equipment. One side of this chamber was open and was fitted to receive a test stopping which could be sealed in place to form a closed chamber. In making a test a stopping was subjected first to air pressures, slowly applied, and then to a series of pressures of increasing intensity produced by the explosion of charges of black powder, until failure occurred. As the pressures were applied measurements were made of the intensity of the pressures and of the deflection of the slabs. A report on the investigation was submitted to the Bureau of Mines and the data obtained served as a basis for recommending methods of design.

Hollow tile and concrete floor slabs—Investigations on the strength of combination hollow tile and concrete ribbed floor construction have been continued. Since 1924 the Bureau has been co-operating with the Hollow Building Tile Association in a study to determine the structural value of hollow tile in such construction and to obtain data useful in the preparation of standards and specifications for floor tile. Specimens in the form of beams were built to represent portions of floor slabs and were tested to failure. The first series of these tests was reported in Technologic Paper No. 291. Another series in which 60 beams were tested has now been completed.

The data from the second series give information on the assistance of the tiles in

resisting stresses and on the relative value of tiles of different design. The tiles added materially to the shearing resistance of the beams, the assistance being dependent chiefly upon the strength and the thickness of the shells bonded to the concrete.

Stevenson Creek, Calif., experimental concrete arch dam—As a part of a general investigation of arch dams to develop a sound basis for design, Engineering Foundation sponsored the erection and testing of an experimental concrete arch dam at Stevenson Creek, Calif. The Foundation financed the investigation by contributions solicited from industrial organizations and appointed a committee of engineers to plan and supervise the project. The Bureau has for the past two years assisted by placing a member of its staff in charge of the testing.

The test dam, being 60 ft. in height, is of sufficient size to fairly represent commercial structures. Since it was built for testing, unusual care was taken in construction to assure that the features of the dam would correspond to the design plans. Provisions were made during construction for the instruments required in the tests. A means for controlling, at all times, the amount of water in the pond formed by the dam was also provided. In spite of the magnitude of the dam and the lack of temperature control, the test procedure resembled a laboratory test in the care used to obtain reliable data.

Progress reports of the tests have been published in several bulletins of the Engineering Foundation. The tests of the dam have been completed and a preliminary report containing a summary and an analysis of the test data has been prepared for the review of the committee of the Foundation on arch dams.

Publications—"Some Results from the Stevenson Creek Arch Dam Tests," W. A. Slater, *Modern Irrigation*, June, 1927.

The composition of chemical lime—In connection with the preparation of specifications for lime for the chemical industries complete analyses have been made of 35 representative samples of chemical quicklime and hydrated lime from widely separated parts of the country.

Briefly, the results show the SiO_2 content of the limes to be from 0.11% to 4.01%. Of the 35 samples analyzed, 30 contain less than 1.00% SiO_2. With the exception of one sample, which contains 0.92%, the Fe_2O_3 content of the entire group is below 0.35%. The Al_2O_3 content varied from amounts "not detectable" to 2.75%. Manganese was found to be quite low, the highest percentage determined being 0.10%, yet most of the samples had this constituent present in "traces." (Less than 0.01%). Arsenic was not detected in any of the limes by the Gutzheit method, using 10 gram samples. The calcium oxide content was uniformly high, varying within quite narrow limits for respective high calcium and dolomitic limes. The average CaO content of the high calcium limes approximated 96%. MgO was present in two samples in dolomitic proportion, otherwise it varied from 0.11% to 3.88%. The SO_3 content varied quite widely from traces in a number of samples to 4.33%. This constituent was not detected in two samples. Some CO_2 was present in the samples in amounts varying from 0.02% to 4.72%; P_2O_5, although present in only small amounts, was not an uncommon constituent, the amounts varying from "not detecable" to 0.20%. "Loss on ignition" averaged approximately 1.00% for the quicklimes and approximately 25% for the hydrates. One sample showed 2.77% of "insoluble matter" in 1:9 HCl, while the remainder contained less than 0.70%.

Publications—"The Composition of Chemical Limes," by J. W. Rogers, *Ind. and Eng. Chem.*, October, 1927.

The fineness of slaked chemical quicklime—A determination of the "fineness" of slaked chemical quicklime has been made during the year. Many of the chemical industries using lime find it advantageous to use quicklime in order to utilize the heat of hydration. This principle is used, for example, in the liberation of NH_3 from the ammonical liquors produced in the byproduct coke industry. In those industries in which quicklime is used as a reagent, it is desirable that during the process of hydration the disintegration of the quicklime should be as complete as possible. A fine state of subdivisions increases the rate of solutions and the speed of reaction. Coarse material not only decreases the rate of solution and efficiency of the lime but also has a deleterious effect on processing machinery. In following substantially the practice recommended by the American Society for Testing Materials for determining the finess of masons' hydrated lime, gave the following results:

FINENESS OF SLAKED CHEMICAL QUICKLIME

	Retained on No. 30 sieve per cent	Passing No. 30 sieve retained on No. 50 sieve per cent	Passing No. 50 sieve retained on No. 100 sieve per cent	Passing No. 100 sieve retained on No. 200 sieve per cent	Passing No. 200 sieve per cent
Sample No. 11	0.9	0.8	2.6	0.9	94.8
Sample No. 21	2.2	1.7	0.7	2.2	93.2
Sample No. 24	3.1	2.3	1.3	3.7	89.6
Sample No. 28	10.3	2.2	2.1	2.2	83.2
Sample No. 35	3.1	7.4	6.9	5.6	77.0
Sample No. 17	2.6	2.5	3.6	3.8	87.5
Sample No. 8	1.6	0.7	1.6	1.3	94.8
Sample No. 38	22.5	3.1	3.1	2.0	69.3
Sample No. 19	4.8	3.7	2.0	2.9	86.6

The manufacture of lime—Changes occurring in the lime industry since the issue of Technologic Paper No. 16, "The Manufacture of lime," in 1913, made necessary a revision of this publication. To obtain the information desired, twelve lime plants, one ready-mixed mortar plant and one limestone crushing plant were recently visited. Many innovations in the lime industry were observed. The data collected were used in the revision of the technologic paper and included information upon the following: (1) The production of chemical lime; (2) the latest type of gas fired kilns; (3) new processes of hydration; (4) burning of lime in rotary kilns; (5) automatic stokers as applied to shaft kilns; (6) limestone mining.

Furthermore, the inquiry was conducted with a view of obtaining complete information about the process of lime manufacture; of noting the methods of quarrying or mining and crushing; of selecting representative samples of limestone which were forwarded to the laboratory for analysis and study; of observing the methods of burning, temperature and duration of burning, and of sampling the resulting lime; and of following this through the process of hydration and of sampling the resulting product.

Publications—"The Manufacture of Lime," Bureau of Standards Circular No. 337, 45 cents.

"Analysis of Hydrated Lime by a Thermochemical Method," D. F. Richardson, *Ind. and Eng. Chem.*, Vol. 19, No. 5, page 625, May 1927.

Some properties of quicklime mortars—The putty yield of different quicklimes, per unit of weight, varies with the chemical and physical properties of the quicklimes. This difference in putty yield has been the subject of considerable discussion in the preparation and use of quicklime mortars. Magnesian quicklimes with lower average putty yields than high calcium quicklimes will under certain conditions produce stronger mortars than those prepared from high-calcium limes, and this has been the basis for the statement that mortars of magnesian limes leaner than those of high-calcium can be used with satisfactory results. A comparison of the putty yields of quicklimes to the strength (tensile and compressive), plasticity and shrinkage of mortars prepared from them indicates that the greatest amount of sand that can be employed with a quicklime in the preparation of a mortar cannot be determined by its putty yield.

The expansion of calcined gypsum on setting—The expansion which occurs when calcined gypsum sets is one of its important properties. This property makes gypsum an excellent material for casting purposes, as it enables the material to give true reproductions of the mold. In some other uses this expansion is undesirable and is to be avoided if possible.

An investigation was conducted to determine whether it would be possible by simple methods to control this expansion. It was found that the expansion might be controlled within certain limits by control of the ingredients of plasters and of the conditions under which they are used.

An increase in the proportion of mixing water decreased the expansion. Using a given proportion of water, finely ground gypsum expanded much more than coarsely ground gypsum. With sand as an aggregate, an increase in the proportion of sand decreased the expansion, while a mix made with coarse sand expanded less than one with fine sand, when the amounts of sand used were the same.

Retardation of the setting time had little effect on the final expansion but caused an initial contraction so that the final volume was less than that obtained with unretarded materials. Evaporation increased this effect.

Variations in the time and temperature of calcination were tried, but these produced little differences in the expansion on setting. The use of certain admixtures decreased the expansion to a marked extent.

Publications—"The Expansion of a Calcined Gypsum on Setting," by J. A. Murray, ROCK PRODUCTS, 1927.

"Some Advances in Gypsum Technology," J. M. Porter, *Chem. and Met. Eng.*, Vol. 33, No. 9, page 549, September, 1926.

The effect of various admixtures upon the physical properties and workability of gypsum-sanded plasters—In an investigation dealing with plasters of different formulas information has been obtained relative to the effect of certain materials on some of the more important physical properties of gypsum-sanded plasters containing these materials. Sand, hydrated lime, talc, asbestos, and two types of clay were the materials studied. These were added to both 1:2 and 1:3 gypsum-sanded mixes in quantities sufficient to replace 5, 15, and 25% of the calcined gypsum present. Each mix so prepared was tested for workability, tensile and compressive strength, water-carrying capacity, time of set, and wet volume. The effects of varying the amount and grade of sand were also studied. A new method of determining the degree of workability of gypsum-sanded plasters by means of a modified Emley plasticimeter was developed.

It was found that for straight sand-gypsum mixes the workability and strength of the plaster decreased as the sand-gypsum ratio was increased. Within certain limits the strength of a gypsum-sanded plaster decreased and the workability increased as the fineness of the sand was increased. In most cases the addition of the various admixtures resulted in an increase in ease of workability and a decrease in strength of the plaster.

An acoustical gypsum plaster—A plaster which will absorb 10 to 15% of the sound striking it will remedy the conditions of most of the auditoriums, theaters, churches, etc., having acoustical defects. An investigation has been conducted during the year having as its object the development of such a plaster.

To absorb any appreciable amount of sound energy a plaster must possess a porous surface of such a nature that the sound will penetrate into the plaster and be changed to some other form of energy. The surface of the ordinary sanded plasters or of the lime-gypsum white finish coat does not have the required porosity, hence practically all sound striking such a plaster is reflected back into the room. This condition gives rise to the objectionable echoes and reverberations which are so often found in public buildings.

By adding small amounts of alum or aluminum sulphate and a carbonate ($CaCO_3$, for example) to a calcined gypsum-sand dry mix it has been found that a plaster may be prepared which possesses the desired characteristics of surface porosity and which may be easily worked and applied. When this plaster is wetted the alum and carbonate react to form carbon dioxide (CO_2) which is entrapped in the body of the plaster in the form of countless minute bubbles of gas. When the plaster is applied to a water absorptive backing such as an ordinary scratch or brown coat of plaster the excess water in the wet acoustical plaster is partially removed by the absorptive effect of the backing and the water films surrounding the gas bubbles are broken, leaving a large number of communicating small pores throughout the plaster. These small gas bubbles also serve another purpose in increasing the workability of the plaster and thus making it easier to apply.

Many different types of aggregate have been experimented with in an effort to find the most satisfactory one for use. Among those investigated may be mentioned sand, pumice, raw and calcined diatomaceous earth, cinders, ground cork, asbestos, tufa stone (a volcanic ash) and several others. Of these the pumice, calcined diatomaceous earth, and tufa stone produced the most satisfactory plasters. A plaster containing two parts granulated tufa (graded to pass a No. 14 and be retained on a No. 40 sieve), one part sand (graded from sieve No. 10 to sieve No. 30), and one part of calcined gypsum, to which was added a small amount of a calcium carbonate-potassium alum mixture and a retarder, had approximately the sound absorbing properties desired. It is possible to increase the percentage sound absorption by increasing the tufa-calcined gypsum ratio, increasing the tufa-sand ratio, or increasing the particle size of the aggregate.

The deterioration of calcined gypsum—The common method of storing calcined gypsum is in paper or cloth sacks, neither of which is air tight. It has been found that calcined gypsum in certain cases, when stored for long periods in this manner, deteriorates. This deterioration is evidenced by poorer working qualities. The deterioration is by no means universal, gypsums produced in certain sections being practically free from deterioration while with those from other sections the deterioration constitutes a serious difficulty.

While there is little evidence as to the cause of the deterioration, it is commonly supposed to be due to partial rehydration of the calcined plaster, caused by absorption of moisture from the air. From the varying rates at which this rehydration occurs, it would seem to be, at least in part, due to certain catalytic agents present in the form of impurities in the gypsum. This view is supported by some data on the effect of storage of gypsum, developed at the Bureau of Standards for use in another investigation.* In the course of this investigation several samples of calcined gypsum, representative of the industry throughout the country, were exposed to the air for six months. At the end of this period moisture determinations showed that rehydration had occurred, and to a greater extent in certain samples than in others.

An investigation has been started to determine the causes of the deterioration and also to determine methods by which it may be prevented. The first step in this investigation is exploratory in nature, being, namely, to check the assumption that the rehydration is catalysed by certain impurities. A good grade of calcined gypsum was obtained, and approximately 70 portions of this gypsum were intimately mixed with 1% of various impurities. These portions with several blanks of the original gypsum were analyzed for moisture content and then exposed in shallow trays. After several months' exposure the moisture content will be again determined.

Limestone research—The results of the determination of certain of the physical properties of the principal limestones of the United States ordinarily employed for cut stone construction have been published as Bureau of Standards Technological Paper No. 349. This paper contains the results of tests on 134 samples of limestone from Alabama, Illinois, Indiana, Kansas, Kentucky, Minnesota, Missouri, New York and Texas. In addition to the usual physical determinations of strength, elasticity, absorption and porosity, this publication contains results of weathering, discoloration, fatigue, permeability, thermal expansion and efflorescence tests. The average strength in compression perpendicular to the bedding was indicated to be 9030 lb. per sq. in. with a range from 2500 to 28,400. A comparison of the results of various tests in this series has indicated the following average ratios for limestone:

Tensile strength: Comp. strength	=0.05
Transverse strength: Comp. strength	=0.17
Shearing strength: Comp. strength	=0.20
Compressive strength—Wet: Compressive strength—Dry	=0.01
E in flexure: E in compression	=0.75
Absorption (2wk. immersion): Porosity	=0.70

*"Effect of Storage of Calcined Gypsum on the Linear Expansion," L. E. Smith, "Rock Products," October 3, 1925.

The use of elastic pointing materials in masonry construction has assumed such importance that a study of the merits of such materials has been deemed advisable. An investigation along this line has been started in connection with the co-operative work being carried out by this Bureau and the Indiana Limestone Co. The main points under consideration in this connection are as follows: (1) The ability of the preparations to maintain a waterproof joint when submitted to strains similar to those caused by structural movements. (2) Effects of high and low temperatures equivalent to the usual annual temperature range. (3) Discoloration or other undesirable effects caused by the use of such materials on stone masonry.

The work on steam cleaning was completed during the year, and the results described in "The Development of the Steam Cleaning Process," by H. H. Dutton, *Stone*, Vol. XLVIII, No. 4, page 225, April, 1927, and No. 5, page 288, May, 1927, reprinted in *Buildings and Building Management*, Vol. XXVII, No. 12, page 41, June 6, 1927.

Maintenance of interior marble—The research conducted by this Bureau in co-operation with the National Association of Marble Dealers was completed in March, 1927. The results of this work have been published in Bureau of Standards Technologic Paper No. 350, entitled "A Study of Problems Relating to the Maintenance of Interior Marble." An abstract of this paper has also been published by the National Association of Marble Dealers in a booklet entitled "The Maintenance of Interior Marble." These publications contain the results of investigations to determine the undesirable effects which may occur due to the use of certain types of cleaning preparations, recommendations as to cleaning preparations and methods for cleaning marble, injurious effects of various salt solutions which may penetrate marblework under various conditions of use, methods of removing various kinds of accidental stains from marble, and recommendations for means of installation of marble to prevent certain troubles from discoloration or disintegration.

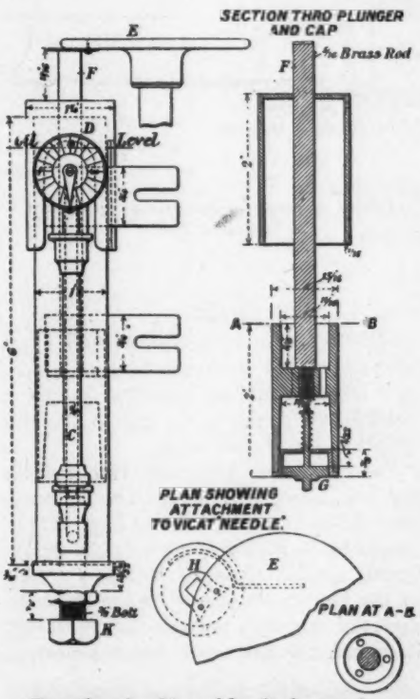
Physical properties of slate—Work is in progress on the physical characteristics of the various slate deposits in the United States. Samples have been received from a considerable number of the producing quarries and testing is well under way. The data will form the basis of a report similar to that described above for the commercial limestones.

Weathering tests on building stones—Freezing tests are in progress on samples of natural building stone from a considerable number of important deposits in this country, to determine the relative resistance to frost action. Due to the length of time required to make such tests it has not been possible to publish a complete report on this work. The results of frost action tests on limestone so far as completed were included in Technologic Paper No. 349. Improvements have been made in the automatic freezing and thawing apparatus which will add materially to the facility of this work.

Adjustable Dash Pot for Cement Testing

AN adjustable dash pot which can be attached to the usual form of Vicat needle apparatus has been designed at the Imperial Institute, London, England, by A. T. Faircloth. The device is designed to mechanically control the lowering of the Vicat needle rod to the cement paste, thereby assuring a standard condition of testing.

The apparatus consists of a brass cylinder containing a hollow piston or plunger, which is made somewhat long in relation to its diameter in order to maintain the vertical



Details of adjustable dash pot for cement testing

position of the piston rod throughout its travel. When in use, the circular head of the rod of the Vicat apparatus, marked *E* in the sketch, bears upon the free end of the piston rod *F*, the oil in the cylinder being forced through the tube *C* and needle valve *D* to the top side of the piston. The speed, therefore, at which the "needle" or plunger of the Vicat apparatus enters the cement paste is controlled by the regulation of the oil flow at the valve *D*. It may be mentioned that the rate of fall adopted at the Imperial Institute is such that the indicator of the Vicat apparatus travels from top to bottom of the scale (40 mm.) in five seconds when the rod carrying the "needle" is running freely and not in contact with the cement paste. The piston is fitted with a valve *G* at its lower end, and is bored with three ⅛-in. holes, as shown in the section, thus permitting a quick return of the oil when the piston is drawn to the top of the cylinder before commencing a test.

The ordinary Vicat apparatus, as sold, has a piece of brass fixed to the circular rod carrying the "needle" and running in the slot of the indicator scale; this serves the twofold purpose of preventing rotation of the rod and "needle" when in use, and also acts as a support for the indicator which is screwed to it. A certain amount of friction, however, is produced between the attachment and the sides of the slot in which it moves, and it has been found advantageous slightly to chamfer the edges of the attachment in order to overcome this defect. The rotary movement of the rod is prevented by squaring the free end of the piston rod of the dash pot and fitting it into a small piece of brass *H* attached to the circular head of the Vicat apparatus, as shown in the attachment plan. A thin cap of brass serves to prevent dust from reaching the oil, which, of course, should be free from sediment and show no tendency to separate on standing. Any requisite adjust of the travel of the piston to conform with the range of the indicator scale is made by means of the bolt *K* at the bottom of the cylinder. This adjustable dash pot has been in use in the cement testing laboratory of the Imperial Institute for a considerable time and has given every satisfaction.

Fatalities Reduced in Mine Explosions by Rock-Dusting

IN A STATEMENT considering safety methods in mines, the Bureau of Mines, Department of Commerce, points out that 125 lives were saved in the explosion at the Delaguae No. 3 mines of Colorado by the practice of rock-dusting bituminous coal mines.

The statement discusses protection against lightning in mines, proper voltages for underground mining and portable electrical equipment in gaseous mines, giving references in each case to literature prepared by Bureau of Mines experts.

The full text of the statement follows:

The practice of rock-dusting bituminous coal mines as a means of preventing or limiting coal explosions is largely credited with the saving of 125 lives in the recent explosion at the Delagua No. 3 mine of the Victor Fuel Co., Delagua, Colo., by E. H. Denny, Bureau of Mines, Department of Commerce, in a recently issued paper.

This explosion resulted in the loss of seven lives and in considerable damage to the mine slope and to several overcasts. The explosion did not extend into the mine workings where 125 additional men were employed and escaped uninjured.

In Serial 2838 published by the Bureau of Mines, various safety measures put in practice at this mine are reviewed.

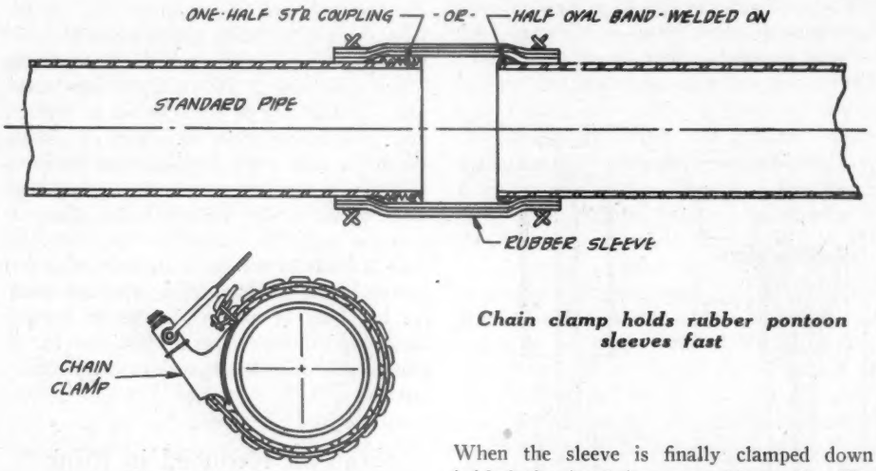
Hints and Helps for Superintendents

Simple Device for Connecting Pontoon Sleeves

By JEAN M. ALLEN
Consulting Engineer, Chicago

MANY operators of sand and gravel pumping plants experience difficulty from rubber dredging sleeves blowing off the pontoon pipe by the pressure in the pipe line. Often elaborate chains and clamps are used which are expensive, reduce the flexibility of the pontoon line and take considerable time to attach.

The device shown on the enclosed sketch is standard practice among the large hydraulic dredging contractors, but may be new to the sand and gravel operator. With this method there is slight danger of the line blowing apart, and the line may be opened and a pontoon put in in a few minutes. If the pontoon pipe is threaded a standard sleeve coupling is cut in two and one-half screwed on each of the pontoon pipe. If the pipe has plain ends a piece of half oval steel band, about ⅜x1¼-in. is welded around the end of the pipe. The inside diameter rubber sleeve must be about ⅛-in. larger than the outside diameter of the coupling or band.



Chain clamp holds rubber pontoon sleeves fast

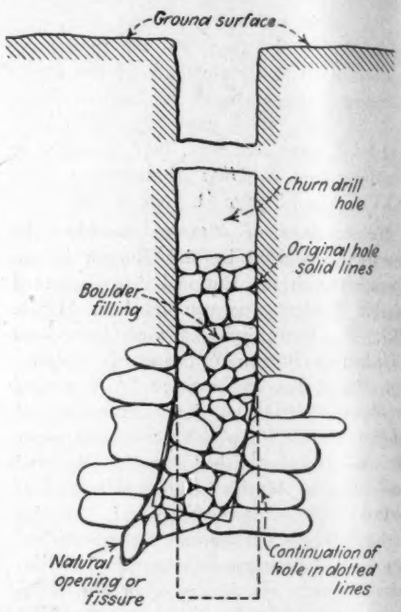
When the sleeve is finally clamped down behind the band it cannot blow off. The band has the additional advantage in that it increases the section at the end of the pipe subject to the greatest wear.

The clamp may be of any type, but the best is a chain clamp, as shown on the drawing. It is a standard device that can be purchased in the open market. It can be quickly applied, and grips the sleeve closely to the pipe at all points. When the pressures are very high two clamps may be used if desired, although this is seldom necessary.

Small gravel operation which makes efficient use of its equipment

Correcting Crooked Well-Drill Holes in Fissured Ground

IN drilling badly fissured ground with well-drills there is always trouble caused by the swerving of the string of tools out of its vertical course. In the southeast Missouri lead district this difficulty is overcome by filling the fissured portion of the hole with small rocks and stones of the same kind as the formation penetrated, as indicated in the accompanying figure. This portion of the hole is then redrilled. Occasionally it is necessary to repeat the procedure two or three times, but often the first trial is successful and the abandonment of the hole is thus avoided.—*Engineering and Mining Journal.*



Correcting crooked well-drill holes

Production Costs at a Small Bank Gravel Operation

USING a ½-yd. shovel and a portable belt conveyor, the Wickham Haven Co., Oakland, Calif., is producing an average of 765 cu. yd. of gravel per day at a cost of about $1.40 per yd., according to figures furnished by the company.

The material is dug by a Pawling & Harnischfeger ½-yd. gas shovel, which only has to swing a few degrees in order to drop it into the hopper which is located at the charging end of the conveyor. The conveyor is 18 in. wide, 42 ft. long, of the cleated belt type, manufactured by the Barber-Greene Co. The hopper is 4 ft. by 8 ft.

and has a capacity of 2 yd. The opening in the hopper is 4½ in. by 5½ in. The material is conveyed to the screen, through which sizes up to ¾ in. pass. There is little lost time and motion, as the shovel loads the trucks direct with base rock, when the trucks arrive, and in between trucks it loads the conveyor hopper. The screened material is stored in hoppers equipped with chutes. The storing hoppers have ample capacity—as it is possible with the conveyor to elevate the material sufficiently. The conveyor is operated at an angle of 22 deg. The portability and flexibility of the conveyor makes it the preferable machine for this operation. Swiveling the conveyor to follow the shovel is only a job of a few minutes.

Roller Bearing Mountings for Quarry Car Motors of Electric Haulage System

ANTI-FRICTION bearings are playing an important part in the rock products industries. Only recently rock crushers and quarry cars have been equipped with roller bearings, with advantageous results. Now what is reported to be the first test of roller bearings on the armature shafts of Woodford cars, a particular type equipped with motors and part of the Woodford electric haulage system, has been made at the Dolese & Shepard Co. quarry at McCook, Ill. One car at this plant has been equipped with Hyatt roller bearings and has been taken down for inspection after six months of operation.

According to the report, the car was in service 156 working days, making 4368 trips totaling 9984 miles, and transported during this period 47,611 cu. yd. of stone. The roller bearings showed no perceptible wear when inspected at the expiration of the test, and will be reassembled and put back in service. The initial installation of Hyatt bearings on the car is said to have proven satisfactory and additional cars are being similarly equipped.

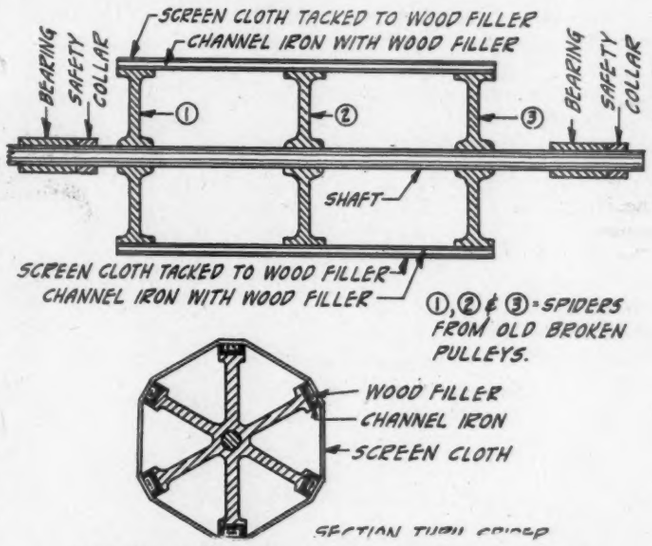
The motors on the Woodford cars operated by Dolese & Shepard are Allis-Chalmers 35-hp., Type R-35-A, d.c., series wound, of which there are two to each car. To change over from babbitt bearings to Hyatt roller bearings, the motor frame has to be bored slightly larger to accommodate the roller bearing housing, and the armature shaft turned down so the inner race can be pressed on.

Small Revolving Screen Easily Made at the Plant

By W. L. HOME
Consulting Engineer, Pine Plains, N. Y.

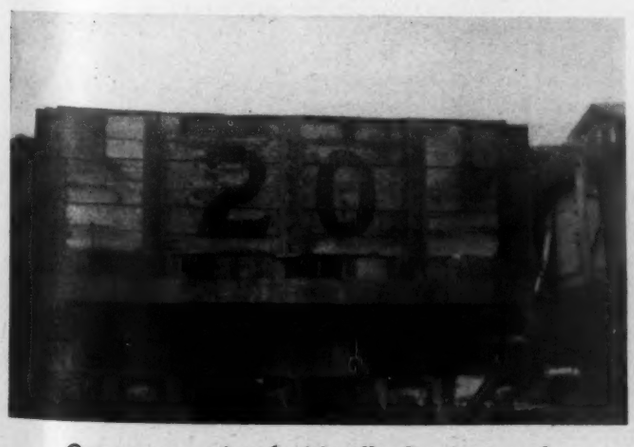
THE sketch shows an efficient, servicable revolving screen quite easily constructed out of old materials obtainable from most any crushing plant junk pile or at least easily obtainable wherever old machinery has been scrapped.

After selecting a shaft sufficiently large to support the necessary weight and to allow for bearings with ample bearing surface, find three pulleys of the correct bore for the diameter of the chaft and which are of the required diameter for the size screen wanted. Should the pulley faces be narrow that is all the better since excess weight should be avoided. Should the pulleys selected be pressed steel, all that is necessary to prepare the pulley for the screen is to remove the rivets that hold the rim to the spider. If the pulleys are cast iron cut away all that part of the rim except a small section at the end of each spoke to bolt the channel irons to as shown in the sketch. Mount each spider on the shaft in the desired position with each spider arm or spoke parallel. To the ends of the spider arms bolt the channel irons. This completes the skeleton frame of the screen. If fine mesh wire cloth is to be used bolt a wooden filler in the channel of each channel iron. The screen cloth can then be stretched as tightly as possible and tacked securely to these filler blocks. If a coarse mesh wire is to be used the screen should be prepared on iron frames in proper sized sections so that the sections can be bolted to the channel irons by whatever method the operator deems most expedient for his own local conditions. The drive for the screen can be made similar to that of any other revolving screen. If it is desired to make a conical discharge screen so that the shaft may be in a horizontal position and driven direct by a pulley mounted on the shaft use a small pulley at the head end of the screen and a large pulley at the tail end and proceed along the lines of the above.



A small revolving screen easily made at the plant

The design given above may be followed to make a screen as described in the preceding text.



Quarry car equipped with roller bearings on the armature shafts

Motor frame of the quarry car with the armature removed

Know Your Strata

What the Research Laboratory of the France Stone Company Has Accomplished in 1927

By Herbert F. Kriege, Ph.D.
In Charge of Tests, The France Stone Co. Laboratories, Toledo, Ohio

THE day has come when practical information is replacing private influence in salesmanship. It has become as important for a crushed stone salesman to know the hardness, toughness and soundness of his company's product as to know prices and freight rates, or to have "a pull." More rigid specifications, closer inspection, and better informed competition are combining to cramp the style of the producer who does not know his strata. Systematic testing is becoming the recognized means of building up this vital fund of information.

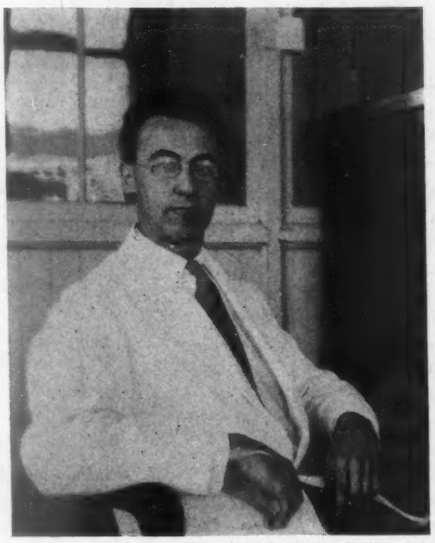
Since the establishment of the France Stone Co. Laboratories in August, 1926, the forms of service rendered the parent company have been varied and many. The most outstanding has been the information obtained from the physical and chemical analysis of the cores taken from each of the quarries operated by the France Stone Co. The cores were taken with a 2¼-in. diamond drill to a depth of 30 ft. to 90 ft., depending on the operation conditions. Samples were made of each distinctly different stratum and subjected to the standard A. S. T. M. physical tests for hardness, toughness, abrasion, absorption, specific gravity, and soundness. The usual chemical constituents were determined. Frequently petrographic studies were made with the microscope to account for differences not otherwise discernible.

All these data compiled amount to an accurate inventory which is a prime requisite to a successful business. Not only is the quality determined of the material now being produced, but the quantities and the properties of the several kinds of stone in the reserve portions of the quarries are known. Stone well suited to special uses such as in trickle beds for sewage disposal plants, "sugar" stone, flux stone, stone for lime and cement has been identified. Material not up to grade A has been located and its bounds defined. Therefore, the problems of judicious operation have been greatly simplified, and the sales force has been fortified with facts.

Routine Tests Keep Up Quality

By consistent testing of the stone being produced, improved quality has resulted in the sizing and cleanness of all materials. Rejections have been greatly reduced and the purchasing public has responded to the better product.

Additional impetus was given the sale of screenings to the cement products manufacturers. It was shown that blocks made of sand and pea gravel could be improved by the use of 20-40% of limestone screenings. The value of screenings lies chiefly in the greater early strength given the green blocks, thus reducing the breakage loss during the early curing process. Greater plasticity of the wet batch is obtained with the same water content when screenings are used.



Herbert F. Kriege, in charge of France Stone Co.'s laboratory

Special Aid for Various Uses

Special consideration has been given the matter of soundness in limestone destined for use in trickling filters. Sanitary engineers are demanding that 10 or 20 or even more sodium sulphate immersions be withstood before a stone is accepted for this purpose. That seems rather severe, but the intense weathering conditions which are imposed on trickle bed stone are not found often elsewhere. So few data are available from long time observations under actual conditions that the evaluation of sodium sulphate soundness cycles into years of life in the trickle bed is not yet fully understood. Until that time, to protect the purchasing municipality from sad experiences it behooves the installing engineer to move with caution in the question of stone. It is obvious that the stone industry can serve itself as well as others by finding material suitable for this purpose, which is fast assuming large proportions.

Other noteworthy problems which are receiving attention in our laboratories are the effect of fines in washed limestone sand for concrete, voids in different types of aggregates in relation to the yields and strength of concrete, the properties of chert and cherty limestone, and the rates of solution and of absorption of limestones.

Our laboratories have been able to help the local building industry frequently with consulting services in the design of concrete mixes, testing of aggregates and finished concrete for strength, watertightness, etc., and in the testing of the many types of materials used in highway construction generally. Other producers have found it advantageous to have their stone tested here before offering it to the trade. Thus some service has been rendered beyond the confines of the company. It is a conviction that the value of a research and testing laboratory is becoming increasingly felt in the crushed stone industry and in allied enterprises.

Cement Importation Declined Last Fall

A QUANTITATIVE DECREASE of 16% in the imports of cement into the United States during October, 1927, as compared with October, 1926, is reported by the Department of Commerce. The statement follows in full text:

United States imports of cement totaled 221,274 bbl. (free and dutiable) valued at $321,777 during October, a quantitative decrease of 16% compared with October, 1926, when 263,403 bbl. valued at $386,335 were imported, according to preliminary figures of the Mineral Division of the Department of Commerce.

Belgium furnished 145,991 bbl. (66% of the total) valued at $183,042 during October, 1927; for the same month of 1926 it furnished 236,582 bbl. (90% of the total) valued at $363,445.

Imports of cement for the first 10 months of 1927 totaled 1,751,629 bbl. valued at $2,556,827 compared with imports of 3,042,973 bbl. valued at $4,799,594 for the same period of 1926.

Exports of cement from the United States during October amounted to 67,639 bbl. valued at $230,668, a quantitative decrease of 2.6% compared with American exports of this commodity during October, 1926, of 69,389 bbl. valued at $225,874.

During the first 10 months of 1927 the United States exported 674,861 bbl. valued at $2,312,330; for the same period of 1926 American exports of cement amounted to 803,652 bbl. valued at $2,452,492.

Editorial Comment

ROCK PRODUCTS has been and is an advocate of quality competition in preference to price competition, or at least cut-throat price competition.

Quality Competition

There are some producers who believe it amounts to the same thing, since improvement in quality adds to the cost of production and therefore leaves a smaller margin of profit. We do not believe it amounts to the same thing, even though the commodity of improved quality is sold at the same price as the less valuable commodity was sold for. Unquestionably price-cutting competition is the easiest course to pursue to get business at the expense of a competitor; but it is a course that anyone, even the most ignorant, may follow as long as his stockholder's faith in him lasts. To make a better product requires brains, energy, work and resourcefulness—all desirable qualities in a successful manager. Price-cutting is demoralizing; competition or quality is an inspiration to the exercise of all that is best in personal character and in business.

In times like the present, where there is over capacity in nearly all lines, there are but three courses open to a producer: (1) cut prices and attempt to make up in volume what is lost on the lower margin of profit; (2) cut production and attempt to cut costs as nearly as possible in the same proportion, and be satisfied with a fair share of the total business to be had; (3) sell the product wholly on a quality basis, and as much of it as can be sold by legitimate and ethical promotion.

If he adopts the first method his price cuts merely lead to more price cutting; there is a tendency to cut costs at the expense of quality; there is ill-feeling and distrust throughout the industry. If he adopts the second method he displays a liberalness and generosity that is commendable, but almost Utopian; and he invites new competition as well as encourages old competition by making it possible for even inefficient operations to survive. It is a fine policy in the abstract and well worthy of an attempt to maintain in some degree at least, but like the practice of 100% Christianity, we have hardly reached a stage of civilization (or whatever you want to call it) to expect that such a policy will ever be whole-heartedly subscribed to. The third course will automatically reduce production, because few existing plants can improve quality materially without sacrifice of volume. It will eliminate inefficient operations by a less painful process than price-cutting; it will compel producers to either quit or modernize their plants; it will discourage the novice who has yet to learn the rudiments of the business.

There are so many ultimate advantages in quality competition both to the user, and the conscientious producer that it would seem they justify a present loss of profit.

But, for the time being at least, we can not have 100% quality competition. Certain users, such as for example state highway officials, are thoroughly sold on quality, but a vast number of users will continue to buy on price only. Again we haven't quite reached the point where there are universally recognized standards of quality for either portland cement or aggregates. These are both weighty points, but not so weighty as to deter progress toward better quality products.

For example the arguments that portland cement as made twenty or more years ago was "good enough," and that there is no need to improve it at the expense of increased cost, is hardly a sound argument, because the same reasoning could have been applied to any other commodity, such as iron and steel for example; and had it been accepted where would we be today in many lines of industrial development?

No industry can stand still because it has achieved an accepted standard of quality. If it does not continuously seek to improve the quality and usefulness of its product by evolutionary methods, it is in constant danger of stagnation and of being displaced by revolutionary methods which will produce new products.

Nor is it a particularly serious thing that there is striving and competition for quality, before there is unanimity of opinion as to what constitutes quality, for out of this competition will come standards of quality and new knowledge of the product, which would never be brought to light, if all progress toward something better had to wait on laboratory tests, or long time experience.

We can't see how the cement industry and its complementary aggregate industries can progress and hold their own and conquer the future unless there is unending competition on quality; and in times like the present more attention should be given to improving quality and decreasing production, even at present prices, than to price-cutting. The cutting down of additional costs on account of improved quality is a natural evolution that is bound to follow.

The 1927 Index

A CAREFULLY compiled, complete index of the 26 issues of ROCK PRODUCTS for 1927 has been included as Part II of this issue. This has been bound separately as a matter of convenience to our readers, who no doubt will find it a ready reference to many articles on the many subjects published during the past year.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[37]	Dec. 30	.....	3	7	
Allentown Portland Cement Co. (6% bonds, 1932)[22]	Dec. 5	.....	90	92	
Alpha Portland Cement Co. (common)[3] new stock	Jan. 3	No par	37	42	75c quar. Oct. 15
Alpha Portland Cement Co. (preferred)[3]	Jan. 3	100	.....	115	1¾% quar. June 15
American Lime and Stone Co. (7% bonds, 1942)[33]	Dec. 30	.....	100½	101½	
Arundel Corporation (sand and gravel—new stock)	Jan. 3	No par	46¾	46¾	50c Oct. 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Jan. 4	.....	108	113	
Atlas Portland Cement Co. (common)[3]	Jan. 3	No par	38	40	50c qu. Sept. 1
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% qu. Oct. 1
Atlas Portland Cement Co. (preferred)[3]	Jan. 3	33⅓	43	.....	2% qu. Jan. 3
Beaver Portland Cement Co. (1st Mort. 7's)[3]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Jan. 3	.....	36	39	75c quar. Oct. 31
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Nov. 4	.....	100¼	101	
Bessemer Limestone and Cement Co. (common)	.....	.....	.....	.....	75c quar. Oct. 31
Boston Sand and Gravel Co. (common)	Dec. 29	100	79½	83	$1 qu., $1 ex. Jan. 2
Boston Sand and Gravel Co. (preferred)	Oct. 21	.....	85	90	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Oct. 21	.....	90	95	2% qu. Jan. 1
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Dec. 30	.....	Called at 110		3% semi-annual A&O
Canada Cement Co., Ltd. (new common)	Jan. 3	.....	33	33½	
Canada Cement Co., Ltd. (new preferred)	Dec. 30	.....	97½	98½	
Canada Cement Co., Ltd. (new units)	Nov. 4	.....	107	107½	
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Dec. 30	100	96	99	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Dec. 29	No par	38	40	50c Oct. 10
Charles Warner Co. (preferred)	Dec. 29	100	109	.....	1¾% quar. Oct. 27
Cleveland Stone Co. (new stock)	Jan. 3	.....	66	70	50c qu. 50c ex. Dec. 1
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Dec. 30	100	Called		50c qu. June 15
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Jan. 4	100	96	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Jan. 4	100	94	98	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	Dec. 17	100	100	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[22]	Dec. 28	.....	65	75	
Coplay Cement Manufacturing Co. (6% bonds, 1941)[22]	Dec. 28	.....	50	.....	
Coplay Cement Manufacturing Co. (common)[39]	Dec. 20	.....	11	.....	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Jan. 4	100	99	101	
Dolese and Shepard Co. (crushed stone)[7]	Jan. 3	50	108	.....	1.50 Jan. 1, 1.50 ex. Jan. 1
Edison Portland Cement Co. (common)[39]	Dec. 30	.....	50c	.....	
Edison Portland Cement Co. (preferred)[39]	Dec. 30	.....	1	.....	
Edison Portland Cement Co. (bonds)[39]	Dec. 30	.....	75	.....	
Egyptian Portland Cement Co. 7% pfd.[21]	Dec. 30	.....	85	95	1¾% quar. July 1
Egyptian Portland Cement Co. (common)[21]	Dec. 30	.....	4	7	40c quar. Oct. 1
Egyptian Portland Cement Co. (warrants)	Dec. 30	.....	No market		
Fredonia Portland Cement Co. (6½% bonds, 1940)[22]	Dec. 5	.....	97	101	
Giant Portland Cement Co. (common)	Jan. 8	50	35	45	
Giant Portland Cement Co. (preferred)	Jan. 3	50	40	45	3½% Dec. 15
Ideal Cement Co. (common)	Jan. 3	No par	99	101	$1 quar. Oct. 1
Ideal Cement Co. (preferred)[32]	Jan. 3	100	110	112	1¾% quar. Oct. 1
Indiana Limestone 7's (1936)	Nov. 9	.....	98	100	
International Cement Corporation (common)	Jan. 4	No par	56	57	$1 quar. Dec. 31
International Cement Corporation (preferred)[3]	Jan. 3	100	109	111	1¾% quar. Dec. 31
Kelley Island Lime and Transport Co. (new stock)	Jan. 3	100	53½	55	$2 quar., $2 ex. Oct. 1
Lawrence Portland Cement Co.[3]	Jan. 3	100	106	109	2% quar.
Lehigh Portland Cement Co.	Jan. 3	50	120	125	1½% quar.
Lehigh Portland Cement Co. (preferred)	Oct. 24	.....	73	78	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	Aug. 12	100	99½	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	Aug. 12	100	97½	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	Dec. 30	100	100	.....	
Marblehead Lime Co. (5½% notes)[14]	Dec. 30	100	98	.....	
Michigan Limestone and Chemical Co. (common)[6]	Jan. 3	.....	35	.....	
Michigan Limestone and Chemical Co. (preferred)[6]	Jan. 3	.....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Jan. 3	25	38	38½	50c Nov. 1
Monolith Portland Cement Co. (common)[9]	Dec. 30	.....	13½	14	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Dec. 30	.....	32	33½	
Monolith Portland Cement Co. (preferred)[9]	Dec. 30	.....	9¼	9¾	
National Cement Co. (7% bonds)[33]	Dec. 30	100	96	99	
National Gypsum Co. (common A)[25]	Jan. 3	.....	22	25	
National Gypsum Co. (preferred)[25]	Jan. 4	.....	65	70	
National Gypsum Co. (pref. carrying acc. div.)[25]	Sept. 15	.....	86	88	
Nazareth Cement Co.[20]	Dec. 30	No par	32	34	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Dec. 30	.....	115	.....	
Newaygo Portland Cement Co. (6½% bonds, 1938)[22]	Dec. 28	.....	101	103	
New England Lime Co. (Series A, preferred)[14]	Dec. 30	100	.....	95	
New England Lime Co. (Series B, preferred)[22]	Dec. 19	100	97	99	
New England Lime Co. (V.T.C.)[22]	Dec. 19	.....	33	35	
New England Lime Co. (6s, 1935)[14]	Dec. 30	100	98	100	
New York Trap Rock Corp. (6% bonds, 1946)[33]	Jan. 3	.....	101½	101½	
North American Cement Corp. 6½s 1940 (with warrants)	Jan. 3	100	80¾	80¾	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[30]	Dec. 20	.....	39	41	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Apr. 9	.....	8⅛	9	
North American Cement Corp. (preferred)	Apr. 25	.....	.....	.....	1.75 quar. Aug. 1
North Shore Material Co. (1st Mort. 6's)[15]	Jan. 4	100	98½	.....	
Northwestern States Portland Cement Co.[27]	Nov. 21	.....	165	170	

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price bid	Price asked	Dividend Rate
Pacific Portland Cement Co. (common, new stock)	Dec. 29	.....	25	.....	
Pacific Portland Cement Co., Consolidated[5]	Oct. 21	100	61¼	.....	25c mo.
Pacific Portland Cement Co., Consolidated (preferred)	Dec. 5	.....	81	.....	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	Dec. 29	100	99	.....	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Dec. 30	10	4	4⅝	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Jan. 3	100	98¼	98¾	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	Jan. 4	100	95	.....	1¾% Jan. 3
Pennsylvania-Dixie Cement Corp. (common)[28]	Jan. 3	.....	24	24	60c Jan. 3
Petoskey Portland Cement Co.[1]	Jan. 3	10	11½	12¼	1½% quar.
Pittsfield Lime and Stone Co.[21]	Oct. 8	.....	.....	100	
Pittsfield Lime and Stone Co.[21] (common)	Oct. 8	.....	.....	25	
Riverside Portland Cement Co.	May 9	.....	165	.....	50c monthly, $1.50 ex. Aug. 1
Rockland and Rockport Lime Corp. (1st preferred)[24]	Dec. 29	100	.....	100	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)[24]	Dec. 29	100	.....	65	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)[24]	Dec. 29	No par	.....	50	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	Dec. 6	100	125	125	$2 quar. Oct. 1
Santa Cruz Portland Cement Co. (bonds)[5]	Dec. 20	.....	105½	.....	6% annual
Santa Cruz Portland Cement Co. (common)[5]	Dec. 29	.....	86½	.....	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Dec. 29	.....	24⅝	.....	
Schumacher Wallboard Corp. (preferred)	Dec. 29	.....	25½	26½	
Southwestern Portland Cement Co. (units)	May 11	.....	205	.....	
Superior Portland Cement, Inc. (Class A)[20]	Dec. 30	.....	47½	48	
Superior Portland Cement, Inc. (Class B)[20]	Dec. 30	.....	34	37	
Trinity Portland Cement Co. (units of 1 sh. pfd. and ½ sh. com)[27]	Dec. 31	.....	155	161	
Trinity Portland Cement Co. (common)[27]	Dec. 19	.....	50	60	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	July 14	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	July 14	100	98	100	
United States Gypsum Co. (common)	Jan. 3	20	88½	88½	40c qu. $1 ex. Dec. 31
United States Gypsum Co. (preferred)	Jan. 3	100	122	124	1¾% quar. Dec. 31
Universal Gypsum Co. (common)[3]	Jan. 4	No par	23¼	23½	
Universal Gypsum V.T.C.[3]	Dec. 7	No par	3	3½	
Universal Gypsum Co. (preferred)[3]	Dec. 7	.....	32	35	1½% Feb. 15
Union Rock Co. (7% serial gold bonds)[15]	Oct. 7	.....	Called as of Nov. 1, 1927		
Upper Hudson Stone Co. (1st 6's, 1951)[22]	Dec. 28	.....	92	.....	
Upper Hudson Stone Co. (1st 6's, 1937)[22]	Dec. 28	.....	Called		
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	Dec. 5	100	105	109	
Whitehall Cement Mfg. Co. (common)[30]	Dec. 31	.....	150	.....	
Wisconsin Lime and Cement Co. (1st Mort. 6's, 1940)[23]	Jan. 3	10	5¼	5¾	
Wolverine Portland Cement Co.	Dec. 3	.....	6	.....	15c Nov. 15
Yosemite Portland Cement Co. (Class A, common)	Jan. 4	100	99	101	

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend Rate
Asbestos Corp. of America (5 sh. pfd. and 5 sh. com.)[1]	June 22	.....	$1 for the lot		
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	.....	25c	.....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	.....	$400 for the lot	.....	
Blue Stone Quarry (60 shares)[2]	Mar. 16	.....	$10¼ for the lot	.....	
Coplay Cement Mfg. Co. (common)[4]	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred)[1]	Dec. 30	.....	70	.....	
Eastern Brick Corp. (7% cum. pfd.)[1]	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common)[1]	Dec. 9	10	40c	.....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Globe Phosphate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22	.....	$50 for the lot	.....	
Iroquois Sand and Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.)[1]	Mar. 17	.....	$12 for the lot	.....	
Knickerbocker Lime Co.(x)	June 22	.....	100	.....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	.....	$60 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co.(g)	Oct. 13	.....	.....	£1⅝	
Phosphate Mining Co.[1]	Nov. 24	.....	1	.....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.)[1]	June 23	.....	$200 for the lot	.....	
Rockport Granite Co. (1st 6's, 1934)	Aug. 31	.....	90	.....	
Simbroco Stone Co.[2]	Apr. 20	.....	12	12	
Southern Phosphate Corp.[6]	Sept. 15	.....	1¼	.....	
Standard Gypsum Co. (10 sh. pfd. and 5 sh. com.)[1]	Dec. 28	.....	$35 for the lot	.....	
Tensas Gravel Co. (180 sh. com.)[1]	Nov. 17	.....	$1 for the lot	.....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	.....	$6525 for the lot	.....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd.)[6]	Nov. 3	.....	$1for the lot	.....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick)[8]	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. [1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, Penn. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Pacific Coast Cement Company Bonds Offered

TAYLOR, EWART & CO., INC., and Geoerge H. Barr, Conrad & Broom, Inc., are offering at 98½ and interest, to yield about 6.15%, $2,000,000 first mortgage 6% gold bonds, series "A." To be unconditionally guaranteed as to principal and interest by endorsement of the Pacific Coast Co.

Dated December 1, 1927; due December 1, 1942. Chemical National Bank, New York, trustee.

These data from a letter of Walter Barnum, president of the Pacific Coast Co.:

Company.—Is being organized to construct and operate a modern cement plant at Seattle, Wash., with an initial capacity of 1,000,000 bbl. of finished cement per annum. Engineers estimate its production costs will be the lowest of any cement plant in Oregon or Washington. There is no other cement plant in the metropolitan district of Seattle, and the company's location on tidewater in the center of the principal market of the Pacific Northwest, with direct connections to five railroads, will provide favorable transportation costs, both by rail and water. Supplementing its cement business, the company will be able to engage in the production and sale of limestone and hydrated lime.

Properties.—Company will own in fee a tract of 19 acres, excellently situated on a deep-water ship channel leading directly from Seattle harbor to the industrial section. The property is bordered by a main highway extending to the center of the business district. Here the company will erect a modern, electrically operated cement plant of the most efficient character, so designed as to provide for economical expansion to meet future requirements. Completion of the plant of all liens other than the mortgage securing this issue of bonds will be guaranteed by the Pacific Coast Co.

Company will acquire claims covering an adequate supply of high-grade limestone, the largest item of material cost in the manufacture of cement. Independent engineers report that for cement making purposes this limestone deposit excels in quality and volume any other deposit now known to them on the north Pacific Coast. This supply is estimated to be well in excess of 100 years' requirements at maximum initial capacity. Company will contract, on favorable terms, with the Pacific Coast Steamship Co., a subsidiary of the Pacific Coast Co., for the transportation of its limestone

requirement from quarry to plant during the life of the series "A" bonds.

Security.—These bonds will be direct obligations of the company and secured by a direct first mortgage on the entire property of the company now or hereafter owned. Value of the properties upon completion is reported to be $3,518,000 and total tangible assets of the company $3,918,000 which amount includes $400,000 of working capital.

Earnings.—The annual net earnings of the Pacific Coast Cement Co. available for bond interest and reserves it is estimated will be $536,000, on the basis of 75% of initial plant capacity, or 4.43 times maximum annual interest charges, these earnings are equivalent to 2.68 times maximum annual interest charges, plus the minimum annual sinking fund requirements. No allowance has been made in these estimates for any savings which may be effected by the company by virtue of its close alliance with the Pacific Coast Co., and no sales of limestone or hydrated lime have been taken into account.

Sinking Fund.—Mortgage will provide for a sinking fund based upon the number of barrels of cement produced and sold by the company, which together with an additional sinking fund based upon net income available for common stock dividends, is designed to provide a minimum of $80,000 per annum. Interest savings on bonds retired are to be added to sinking fund. It is estimated that through the operation of the sinking fund 75% of this issue will be retired prior to maturity.

Capitalization.—

	Authorized	Outstanding
First mortgage sinking fund gold bonds	$3,000,000	$2,000,000
Preferred stock, 7% cumulative (no par value)	20,000 shs.	*7,500 shs.
Common stock (no par value)	100,000 shs.	*100,000 shs.

*Already underwritten.

Purpose.—Proceeds from the sale of this issue of first mortgage bonds will be used to pay, in part, for the cost of properties acquired, the cost of the plant and equipment, to provide working capital, and for other corporate purposes.

Chico Stone Products Preferred Stock Offering

INDUSTRIAL SECURITIES CO., Dallas, Texas, are offering $200,000 10% preferred stock of the Chico Stone Products Co., Chico, Texas, at 100 and interest. The following details are from an advertisement of the offering appearing in the *Dallas* (Texas) *News:*

Property: This company owns and operates two large rock crushers and quarries situated in Wise county, approximately 90 miles northwest of Dallas and Fort Worth, Texas, and produces a high grade of crushed rock for road building, concrete aggregate, railroad ballast and by-products. A large proportion of the plant's output is taken by the state highway department at Austin, and reference is made to their analysis as a road-building material. The company holds long term leases on practically all the available limestone rock land in Wise county, constituting an almost unlimited supply. The company owns and operates 2½ miles of standard gage railroad connecting with the Rock Island railroad and Fort Worth and Denver railroad, with adequate equipment. The properties are appraised by Coats and Burchard of Chicago as follows:

Plant No. 1	$186,197
Plant No. 2	420,913
Total	$607,110

The present company is a consolidation of two companies operating independent plants, etc., situated about two miles distant from each other, and began output in quantity about June 1, 1927.

Other Products: In addition to crushed stone for road building, the company produces stone for concrete aggregate, railroad ballast and agricultural limestone. A deposit of limestone has been located on the property which on test has proven to be high grade and suitable for the manufacture of lime. The company contemplates the early erection of a modern lime manufacturing plant to include a hydrate unit.

Earnings: Net profits for the months of June, July, August and September were $19,588.54; this shows approximate earnings for the four months practically sufficient to meet the dividend requirements of the entire issue of $200,000 preferred stock.

Purpose: The proceeds derived from the sale will be utilized as follows:

Balance on plant purchase	$ 82,500
Lime kiln and hydrating plant	30,000
Retirement of preferred stock now outstanding	42,000
Operating capital and other purposes	45,500
Total	$200,000

This will leave the company with no outstanding indebtedness other than current paid obligations, there being no bonded indebtedness against the properties.

Issue of $30,000,000 Preferred Approved by Lehigh Portland

AT a special meeting of stockholders of the Lehigh Portland Cement Co. an issue of $30,000,000 of 7% $100 par preferred stock was approved. Directors at their next meeting are expected to declare a 100% stock dividend on the present outstanding $50 par value common, payable in the newly created preferred stock.

Canada Cement Co. to Retire Outstanding 6% Bonds

THE Canada Cement Co., Ltd., announces that it will on March 3, 1928, redeem all the outstanding 6% 20-year first mortgage bonds at 110 and interest at the office of the Royal Trust Co., Montreal, Canada, or at the principal offices of the Bank of Montreal, Montreal, Canada, and London, England.

Cleveland Stone Extras

DIRECTORS of the Cleveland Stone Co. have declared regular quarterly dividends of 50 cents a share for a year in advance and increased the extra to be paid to 50 cents a share.

Regular dividends will be paid on December 1, March 1, June 1, and September 1 to stock of record of the 15th of the preceding months. The company has been paying 50 cents quarterly and 25 cents extra.

Lafarge Aluminous Cement Co. Reports Deficit

THE Lafarge Aluminous Cement Co. reports for year ended March 31, 1927, a loss for period, after providing for all charges, amounting to £20,177, to which has to be added balance brought forward, making a total debit balance on profit and loss account of £22,669. During the year company was called on to face serious consequences of general and coal strikes, and results of those strikes are naturally reflected in accounts. Although considerable quantities of fuel were obtained before the coal strike, further supplies could only be obtained during strike at a very high cost, and eventually, owing to inability to obtain suitable fuel, it was found necessary temporarily to close down. With a view to reducing costs certain portions of factory have been redesigned, which has necessarily involved an outlay of capital additional to that which was originally anticipated.—*Quarry Surveyors and Contractors Journal* (England).

Stocks Sold at Auction

BARNES and Lofland, Philadelphia, Penn., sold 100 shares of National Gypsum Co., Class A, no par at $26 per share; Adrian H. Muller and Son, New York, sold 20 shares of Washington Slate Products Co. and other miscellaneous securities for a lot price of $20; 200 Beaver Board Co. A voting trust certificates at 58 cents each; R. L. Day and Co., Boston, Mass., sold one of lot of stock including 2 warrants of the North American Cement Corp. for an aggregate price of $14 and another lot of which 100 shares of North American Cement Corp. was a part, at $21.

Dividends Declared

Company	Rate	Payable
Arundel Corp. com.	50c qu. and $1 ex.	Jan. 16
Atlas Portland Cement Co. pfd.	66 2/3c qu.	Jan. 3
Alpha Portland Cement Co. com.	75c qu.	Jan. 14
Ideal Cement Co. com.	$1 qu. and $1 ex.	Jan. 1
Ideal Cement Co. pfd.	$1.75 qu.	Jan. 1
Charles Warner Co. com.	50c qu. and 50c ex.	Jan. 12
Charles Warner Co. 1st and 2nd pfd.	$1.75 qu.	Jan. 26
Kelley Island L. & T. Co. (new stock)	62½c qu.	Jan. 1
Sandusky Cement Co. com.	$2 qu. and $4 ex.	Jan. 1
Cleveland Builders Supply and Brick Co.	50c	Dec. 20
Santa Cruz P. C. Co.	$1 qu. and $1 ex.	Dec. 24
Monarch Cement Co.	4%	Jan. 5
Boston Sand and Gravel Co. com.	$1 qu. and $1 ex.	Jan. 2
Boston Sand and Gravel Co. 1st pfd.	2% qu.	Jan. 1
Boston Sand and Gravel Co., 2nd pfd.	1¾% qu.	Jan. 1
Pacific Portland Cement Co. pfd.	$1.62½ qu.	Jan. 5

Foreign Abstracts and Patent Review

Alumina and Iron Oxide Cement or Barium Cement with Sulfuric Acid as a By-Product. Bauxite is here replaced by gypum with a high alumina content, which is fused upon receiving admixtures of shale and iron. In making barium cements the high alumina gypsum is fused with barium compounds containing sulfur, silica and alumina or, in the absence of the two latter, with admixtures of alumino-silicate and sand. The products compare favorably with French and German fused alumina cements. The advantage of the process is that bauxite is replaced by gypsum with a high alumina content. *German Patent Application No.* 105,996.

Process of Manufacture of Fused Cement in Rotary Kilns. Parts of the mass forming in the fusing zone of the rotary kiln cling to the walls of the kiln during the rotation, as a result of cooling, thus forming a kiln lining. The kiln may be party or completely lined with any rough lining and receives a lining of the melt as the kiln rotates. *German Patent Application No.* 50,162.

Waterproofing for Quick-Hardening Agent for Cement. Ushinosuke Yoshimura. Japan 6,884, Nov. 6, 1925. The agent is composed of sodium bicarbonate, talc, and a small proportion of calcium carbonate or magnesium carbonate. *Ceramic Abstracts* (1927), 501.

Waterproof Concrete or Mortar. Toichi Nose. Japan 5,360, June 12, 1925. Iron powder or iron sand is dipped in a solution of sodium silicate so as to coat its surface with the salt. The product is mixed with sand and cement or with sand, cement, and gravel. *Ceramic Abstracts,* (1927), 501.

Waterproofing Agent for Cement. Toshiyuki Wada and Shigezo Yamazoe. Japan 5,379, June 19, 1925. A solution of alum or other salts of aluminium is added to a mixture of diatomaceous earth and soap solution so as to make the earth adsorb aluminium salt of fatty acid on its surface. It is ground after drying. *Ceramic Abstracts* (1927), 501.

Process of Manufacturing Waterproof Substances from Alkali Silicates and Acidic Anhydrous Inorganic Matter. The Institute of Physics and Chemistry. Japan 5,431, June 24, 1925. One or more of finely ground acidic anhydrous inorganic matters such as diatomaceous earth, quartzite, flint, diaspor, alumino-silicic acids, feldspar, kaolin, and clay are mixed with an aqueous solution of alkali silicate of 1.25-1.38 deg. Bé. They are then dried. The products are used as waterproof refractory cement or paint. *Ceramic Abstracts* (1927), 502.

Softening Agent for Cement Mortar. Yasue Yamaguchi. Japan 8,665, May 7, 1926. The agent is made by adding formalin to a mixture of fatty acid, ammoniacal solution of albumen soluble in alkali, asbestos, and siliceous material as diatomaceous earth or volcanic ash, and then drying filtrate of the mixture. Mortar composed of the agent and portland cement is elastic. *Ceramic Abstracts* (1927), 502.

Method of Preparing Waterproofing Agent for Cement. Ryujiro Yanaka. Japan 7,726, Feb. 10, 1926. Fatty acid is saponified with alkali solution of sodium aluminate and is nearly neutralized by adding resin and ammonia to the hot solution. *Ceramic Abstracts* (1927), 502.

Process of Preparing Strong Cement. Seisei Takamutsu and Kokio Kitagawa. Japan 7,318, Dec. 18, 1925. Diatomaceous earth and alkali carbonate are mixed with portland cement clinker. Then the mixture is pulverized. *Ceramic Abstracts* (1927), 502.

Process of Utilizing Alunite or Its Waste as Flux in the Manufacture of Portland Cement. Heizo Asada. Japan 10,342, Sept. 29, 1926. Alunite, poor waste alunite, or the residue obtained in the manufacture of alum or aluminium sulphate from alunite are utilized in the manufacture of portland cement as a flux. *Ceramic Abstracts* (1927), 502.

Method of Manufacturing Anti-Freezing Agent for Cement. Koichi Toyokawa, Kenji Tamura, and Toyoshi Kurosawa. Japan 8,772, May 19, 1926. Homogeneous mixture of hydroxide, chlorides, and sulphates is prepared by adding sodium chloride and quick lime to concentrated sulphuric acid in excess. Its small addition to a cement as portland cement prevents injury due to freeezing of water. *Ceramic Abstracts* (1927), 502.

Efficiency of Aluminum and Zinc as Gas-Producing Media in Cement. Tests were made by C. R. Platzmann to investigate U. S. Patent No. 1,087,098, which provides for admixtures of aluminum and zinc to cement, substances which in contact with water produce a strong evolution of gas, which may approach 300% by volume. The chemical reaction involved is:

$$2Al + 3Ca(OH)_2 = Ca_3(AlO_3)_2 + 3H_2$$

A similar reaction takes place when zinc is added. The patent provides an admixture of ¼—2% lime for the acceleration of the reaction. This proved unnecessary in the tests about to be described.

Preliminary tests showed that the metals had to be added in a very finely powdered form and had to be thoroughly mixed with the cement before water was added.

A 250 cc. cylinder was used, into which was introduced a mixture of 100 gm. portland cement, 1/10 to ¼% of which was replaced by powdered aluminium, and 50% water. The liberation of hydrogen began 10 to 20 minutes after mixing and was completed in all cases after 1½ hours. The volume increase was but 127% in the most favorable case.

To obtain results approximating practical conditions, further tests were made of cement-sand mixtures. Only a very fine sand could be used, as otherwise segregation took place. Coke cinders were also used.

Admixtures of more than ¼% Al were ruled out, as in such cases all of the metal did not enter the reaction nor was the volume expansion increased appreciably, the beginning of the reaction being characterized by such a violent evolution of hydrogen that the mass did not swell, as it does when acted upon by small gas bubbles. Sand admixtures reduce the effect of aluminium to about 70% and the lighter coke cinders produce an expansion of 100%.

Strength tests showed that the porosity resulted in a reduction of strength. The admixtures used in these tests were 1/10% aluminium. Compressive strength values at 28 days ranged from 70 kg./cm.^{2} (994 lb./in.^{2}) for 25% sand to 7 kg./cm.^{2} (99.4 lb./in.^{2}) for 85% sand. An abrupt drop in strength took place beyond 40% sand. The actual strengths were somewhat higher, however, as the molds were only half or three-quarters filled.

The specific gravity of the concrete, which may ordinarily be assumed to equal 2.0, ranged from 0.76 with no sand to 1.21 with 75% sand.

Powdered zinc admixtures gave less satisfactory results, the expansion of neat cement ranging from 30 to 50% only. Better results were obtained when Killig's method was used, that is, adding calcium chloride to the mix. Tests of other gas liberating substances showed a less marked effect or gave negative results. These were copper-galvanized zinc, aluminum and calcium carbide, sodium carbonate, aluminium chloride, zinc and potassium carbonate, iron chloride and calcium carbonate, magnesium superoxide and stearine.

The collected test evidence disproves statements by J. Meyer and K. Pukall, *Chemiker-Zeitung,* p. 757, 1927, claiming that aluminum was not a suitable agent for the production of porous concrete. ***Chemiker-Zeitung*** (1927) **86**, 833-835.

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF LIMESTONE FLUX

District	Week ended Nov. 19	Nov. 26	Dec. 3	Dec. 10
Eastern	2,466	1,918	1,853	1,737
Allegheny	3,122	2,395	2,553	2,767
Pocahontas	380	384	298	228
Southern	538	481	505	485
Northwestern	784	593	626	420
Central Western	344	378	317	324
Southwestern	535	560	523	586
Total	8,169	6,709	6,675	6,547

CAR LOADINGS OF SAND, GRAVEL AND STONE

District	Week ended Nov. 19	Nov. 26	Dec. 3	Dec. 10
Eastern	9,212	5,798	5,096	3,099
Allegheny	7,593	6,219	5,439	3,815
Pocahontas	827	578	675	491
Southern	11,531	11,021	10,631	9,312
Northwestern	4,873	3,365	2,908	1,485
Central Western	8,914	7,060	7,562	6,125
Southwestern	6,597	6,460	6,720	5,279
Total	49,547	40,501	39,031	29,606

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

District	Limestone Flux Period to Date 1926 Dec. 11	1927 Dec. 10	Sand, Gravel and Stone Period to Date 1926 Dec. 11	1927 Dec. 10
Eastern	164,864	160,493	509,469	533,718
Allegheny	191,408	174,307	383,669	411,072
Pocahontas	25,173	24,498	44,757	46,931
Southern	31,663	28,832	612,221	599,519
Northwestern	70,723	63,397	316,164	344,380
Central Western	25,026	24,208	447,602	470,270
Southwestern	14,676	18,333	257,877	290,637
Total	523,533	494,068	2,571,759	2,696,527

COMPARATIVE TOTAL LOADINGS 1926 AND 1927

	1926	1927
Limestone flux	*523,533*	*494,068*
Sand, stone, gravel	*2,571,759*	*2,696,527*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning December 31:

CENTRAL FREIGHT ASSOCIATION DOCKET

17149. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, polishing, loam, molding or silica) **and gravel**, carloads, Leeland, Ind., to Sherwood, Ohio, rate of 80c per net ton. Present rate, 90c per net ton.

17159. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Attica, Ind., to Pontiac, Ill., rate of 95c per net ton. Rate to be applied as maxima at intermediate points. Route, via Wabash Ry. Present rate, 101c per net ton.

17166. To establish on **gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica, carloads, Kenneth and Lake Ciecott, Ind., to stations on the C. & O. Ry., Twelve Mile, Ind., to Griffith, Ind., inclusive, as shown below:

Present and proposed rates (per net ton):

Station	Pres.	Prop.
Twelve Mile, Ind.	$0.80	$0.87
Fulton, Ind.	.80	.92
Lawton, Ind.	.80	.97
Lena Park, Ind.	.85	1.02
English Lake, Ind.	.90	*2.60
Malden, Ind.	.95	*2.70
Griffith, Ind.	1.10	*3.30

*Sixth class.

17167. To establish on **crushed stone**, in bulk in open cars, carloads, Marble Cliff, Ohio, to stations on the B. & O. R. R., Athens, Ohio, to Porterfield, Ohio, inclusive, as shown below, present and proposed rates per net ton:

Station	Prop.	*Pres.
Athens, Ohio	125c	$†3.00
Canaanville, Ohio	125c	3.20
Stewart, Ohio	125c	3.20
Frosts, Ohio	135c	3.20
Porterfield, Ohio	135c	3.40

*Sixth class. †In connection H. V. Ry. or N. Y. C. R. R. rate is 80c in Penna. R. R. Tariff Ohio F1144; Tariff C. F. A. L. Tariff 231, I. C. C. 941.

Note 1—Minimum weight marked capacity of car.
Note 2—Minmium weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

17170. To establish on **sand and gravel**, carloads, rate of 80c per net ton, Summit Grove District to Champaign and Urbana, Ill., via C. & E. I. Ry., Bronson, Ill., and Illinois Traction System. Present rate, 98c per net ton.

17213. To amend Item 6220 of C. F. A. L. Tariff 218E. I. C. C. No. 1976, naming commodity rates on **building and filling sand**, from Ohio and Pennsylvania points to destinations east of the western termini of Eastern Trunk Lines, so that same will also apply on **gravel** from points in Ohio subject to Group 6604 rates (See Note 3) but not less than 72,000 lb. Present rate—on basis of high grade sand, per Item 4815 of C. F. A. L. Tariff 218E. I. C. C. No. 1976.

17215. To establish on **sand and gravel**, carloads, from Kern, Ind., to Homer, Ill. (Illinois Traction System), rate of 84c per 2000 lb. Present rate—Sixth class per C. F. A. T. B. Tariff 233, I. C. C. 9381.

17221. To establish on **dolomite, raw or crude, and stone, fluxing** (in open cars only) and dolomite, roasted or burnt, carloads, from Genoa, Ohio, to points in Central Freight Association territory as described in C. F. A. T. B. Tariff 130R, the same rates as in effect from Martin, Ohio. Present rates—Classification basis.

17252. To establish on **sand, lake and beach**, carloads, Michigan City, Ind., to Richmond, Ind., rate of $1.76 per net ton. Present rate—$2.02 per net ton.

17261. To establish rate of $1.20 per net ton on **crushed stone**, carloads, Marblehead, Ohio, and other points in Group 1, to Warren and Phalanx, Ohio. Present rate, $1 per net ton.

17265. To establish a rate of 90c per net ton, where now less, on **sand** (all kinds) **and gravel**, carloads, in open cars, from Akron and Barberton, Ohio, to Warren, Niles, Youngstown and Girard, Ohio.

SOUTHERN FREIGHT ASSOCIATION DOCKET

37401. **Granite or stone, crushed** or rubble, from Ocala, Santos and Williston, Fla., to Alma, Ga. Combination now applies. Proposed rate on granite or stone, crushed or rubble, carloads (See Note 3), from the origins mentioned to Alma, Ga., 167c per net ton, based on scale generally observed in establishing rates between points in this territory.

37402. **Granite or stone, crushed** or rubble, from Ocala and Santos, Fla., to Fitzgerald, Ga. Combination now applies. Proposed rate on granite or stone, crushed or rubble, carloads (See Note 3), from Ocala and Santos, Fla., to Fitzgerald, Ga., 176c per net ton, made on the same basis as used in determining the rate on this commodity from Williston, Fla.

37427. **Crushed stone** from Florida origins to Alma, Ga. It is proposed to establish the following reduced rates on stone or granite, crushed, carloads (See Note 3), to Alma, Ga. (local stations on the A. B. & C. R. R.): From Harvard and Groover Spur, 153c; Istachatta, 176c; Ocala, 162c; Kendrick, 167c; Branford, 153c; Reddick, 167c; Williston, 162c; Hailie, 158c; McAllister, 167c; Thompson's Spur, 153c; Rutland, Fla., 162c per net ton, made on same basis as observed in establishing rates from Florida points to destinations in Georgia.

37279. **Marble, granite and stone, crushed**, from Easton, Penn., to Whitestone, Ga. Class A rate of 54c now applies. Proposed rate on marble, granite and stone, crushed, carloads, minimum weight 40,000 lb., from Easton, Penn., to Whitestone, Ga., 37½c per 100 lb—same as rate from New York to Cartersville and Atlanta, Ga.

37310. **Limestone**, from Whitestone, Ga., to New Orleans, La. Class "A" rate now applies. Proposed rate on—**Limestone, ground, powdered or pulverized**, carloads, minimum weight 60,000 lb., from Whitestone, Ga., to New Orleans, La., 279c per net ton, made on basis of scale generally used in establishing rates on this commodity between southern points.

37339. **Molding sand**, from Red Bay, Ala., to Anniston and Gadsden, Ala. It is proposed to establish reduced rate of 145c per ton on sand, molding (See Note 3), from Red Bay, Ala., to Anniston and Gadsden, Ala., made in line, distance considered, with present rates from Prattville Junction, Jackson Lake, Montgomery and Ragland, Ala.

37343. **Sand and gravel**, from Twohy Siding, Va., to Elizabeth City, N. C. Combination now applies. Proposed rate on **sand and gravel**, carloads, minimum weight 100,000 lb. (Except as noted in Note 3), from Twohy Siding, Va., to Elizabeth City, N. C., 158c per net ton. Same as rate in effect from Richmond, Va.

37378. **Limestone or marble, ground or pulverized**, from Sparta, Tenn., to Goldsboro, N. C. Present rate, 396c per net ton (Knoxville combination). Proposed rate on—Ground or pulverized limestone or marble, carloads (See Note 1), except when car is loaded to full visible capacity, actual weight will apply, from Sparta, Tenn., to Goldsboro, N. C., 306c per net ton, which is in line with present rate to Raleigh, N. C., distance considered.

37380. **Silica (sandstone or clay mixture)**, from Apison, Tenn., to Chicago, Chicago Heights, Ill., Milwaukee, Port Edwards and Sheboygan, Wis. It is proposed to establish the following through rates on—Silica (sandstone and clay mixture), ground or pulverized, in bags, carloads, minimum weight 60,000 lb.—from Apison, Tenn.: To Chicago and Chicago Heights, Ill., 610c; Milwaukee, Wis., 671c; Port Edwards, Wis., 911c; Sheboygan, Wis., 811c per net ton. Suggested rates are based by use of proportion of 322c per net ton to Cincinnati, plus proportions acceptable to lines beyond.

37521. **Crushed stone** from Florida points to Baxley, Ga. It is proposed to establish the following reduced rates on crushed stone (See Note 3) to Baxley, Ga.: From Istachatta, Fla., 186c; Ocala and Kendrick, 182c; Branford, 164c; Reddick and Williston, 182c; Haile, 173c; McAllister, 182c; Thompson's Spur, 168c; Harvard and Groover Spur, 164c, and from Rutland, Fla., 182c per net ton.

37560. **Limestone** from Calera, Ala., to Mobile, Ala. (for export to Cuba). Present rate, 20c per

100 lb. (class "N"). Proposed rate on **limestone, ground or pulverized**, carloads (See Note 3), from Calera, Ala., to Mobile, Ala. (for export to Cuba), 167c per net ton, based on scale generally used in the recent past in suggesting rates on crushed stone between other southern points. Suggested rate not to apply to shipside.

37669. Sand, from Chicago, Ill., etc., to Holly Springs, Miss. Present rate, 46c per 100 lb. (Class "A"). Proposed rate on **sand**, carloads, minimum weight capacity of car, from Chicago, Ill., and points taking same rates as shown on pages 37 to 61, inclusive of Agent Jones' I. C. C. 1907, to Holly Springs, Miss., 400c per net ton, made with relation to rate from Chicago to Memphis, Tenn.

37673. Sand, molding, from Mt. Holly, N. C., to Savannah, Ga. Present rate, 264c per net ton. Proposed rate on **sand, molding**, in packages or in bulk, carloads (See Note 3) from Mt. Holly, N. C., to Savannah, Ga., 255c per net ton, made with relation to current rate on common sand.

37717. **Crushed stone**, from Mimms, Tenn., and **sand and gravel**, from Nashville and Johnsonville, Tenn., to M. & O. R. R. stations. It is proposed to establish commodity rates on **crushed stone**, carloads, from Mimms, Tenn., and on **sand and gravel**, carloads (See Note 3), from Nashville and Johnsonville, Tenn., to M. & O. R. R. stations shown below, based on the standard joint line mileage scale, as prescribed by the Interstate Commerce Commission in Docket 17517, in cents per net ton to the following Tennessee points:

To	Mimms, Tenn.	To	Mimms, Tenn.
Crockett	140	Pinson	140
Kenton	140	Henderson	140
Perry	140		

To	Nashville, Tenn.	To	Nashville, Tenn.
Crockett	140	Pinson	140
Kenton	140	Henderson	140
Perry	140		

To	Johnsonville, Tenn.	To	Johnsonville, Tenn.
Crockett	115	Pinson	115
Kenton	115	Henderson	115
Perry	105		

37752. **Limestone, ground or pulverized**, from Portland, Ga., to southern and Carolina destinations. It is proposed to establish interstate rates on limestone, ground or pulverized, carloads (See Note 1), except when cars are loaded to their visible capacity, actual weight will govern, from Portland, Ga., where necessary, to destinations in southeastern Mississippi valley and Carolina territories, on the same basis observed in establishing rates from Ladds, Ga.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

13434. **Stone, broken or crushed**, carloads (See Note 2), from Branford (Pine Orchard Quarry), Conn., to New Haven, Conn., 75c. Reason, to meet motor truck competition.

13499. **Sand**, carloads (See Note 2), from Provincetown, Mass., to Salmon Falls, Maine, 14½c; to Biddeford, Maine, sixth class, per N. Y. N. H. & H. R. R. I. C. C. F2420, via N. Y. N. H. & H. R. R., Concord Junction, Mass., B. & M. R. R. Reason—To permit movement of this traffic against competition.

13501. **Stone, broken or crushed**, in bulk, in gondola or other open top cars, carloads (See Note 3), from New Britain (Cook's Quarry), Conn., to Mansfield, Conn., $1.25 per net ton, via N. Y. N. H. & H. R. R., Willimantic, Conn., C. V. Ry. Reason—Equalization of competitive conditions.

13509. **Stone, broken or crushed**, in bulk in open cars, carloads (See Note 2), from Branford (Piue Orchard Quarry), Conn., to East Bridgewater, Whitman, South Weymouth, Mass., $1 net ton. Reason—To meet competitive conditions.

13605. **Stone, broken or crushed**, carloads, in bulk in open cars (See Note 2), from Plainfield or New Britain, Conn. (Cook's Quarry), East Wallingford or Middlefield, Conn. (Reed's Gap Quarry), to Gaylordsville, Conn., 75c per net ton. (This rate to expire November 30, 1928, unless sooner canceled, changed or extended.) Reason—To meet competitive conditions.

13606. **Sand, common building, and screenings, gravel**, carloads (See Note 2), from Greenbush, Mass., to Milton, Mass., 50c. Reason—To provide same rates as are now in effect to Boston, Mass.

13622. **Lime and limestone**, carloads, minimum weight 60,000 lb., from East Canaan, Conn., to West Stockbridge, Mass., 5c. (To apply only on shipments to be stored at and reforwarded from West Stockbridge, Mass., via rails of the N. Y. N. H. & H. R. R.) Reason—Same arrangement as in effect on lime originating at West Stockbridge, Mass.

13624. **Stone, broken or crushed**, in bulk, in open cars, carloads (See Note 2), from Branford (Pine Orchard Quarry), Conn., and Rocky Hill, Conn., to Higganum and Arnold's, Conn., and sand, building, common or run of bank, carloads, minimum weight 90% of marked capacity of car, from Avon and New Haven, Conn., to Higganum and Aronld's, Conn., 70c per net ton. (Rates to expire on December 14, 1928.) Reason—To meet competitive conditions.

13645. **Sand, building, common or run of bank**, carloads (See Note 2), from Trumbull, Conn., to various N. Y. N. H. & H. R. R. stations, establishment of specific commodity rates from 3½c to 9c per 100 lb. (same local commodity rates on N. Y. N. H. & H. R. R. as enjoyed by competitors), in item on page 394 of N. Y. N. H. & H. R. R. I. C. C. F2795. Reason—To meet competitive conditions.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3839, Sub. 1. **Sand and gravel**, carloads (See Note 1), from Pekin, Ill., to Taylorville, Ill. Rates in cents per net ton. Present, 101c; proposed, 88c.

4257. **Sand**, viz., **blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica**, carloads (See Note 2), from Van's Siding, Greenwich, West Kankakee and Kankakee, Ill., to Chicago, Ill., and points taking same rates. Rates, present, 10c per 100 lb. (Class E); proposed, 90c per net ton.

646A. **Sand, molding**, carloads (See Note 2), from Wilmington, Ill., to Canton, Ill. Present, $1.50 per net ton; proposed, $1.30 per net ton.

1480, Sub. 2. **Sand (mo'ding)**, carloads (See Note 3), from Pontoosuc, Ill., to Racine, Wis. Present, $2.25 per net ton; proposed, $2.16 per net ton.

1526, Sub. 10. **Sand, gravel and crushed stone**, carloads (See Note 1), from Brookport, Cairo and Shelterville, Ill., to Kinmundy, Ill. Present, $1.26 per ton of 2000 lb.; proposed, $1.13 per ton of 2000 lb.

1526, Sub. 11. **Crushed stone**, carloads (See Note 1), from Anna and Pyatts, Ill., to Leo Rock, Ill. (Gorham). Present, 77c per ton of 2000 lb.; proposed, 70c per ton of 2000 lb.

2491, Sub. 1. **Stone, fluxing**, carloads (See Note 3), but not less than 40,000 lb. from Valmeyer, Ill., to Decatur, Ill. Present, 350c per ton of 2000 lb.; proposed, 106c per ton of 2000 lb.

2585, Sub. 2. **Sand, viz., blast, engine, foundry**, molding or silica, carloads (See Note 1), from Aiken, Ill., to Bloomington, Ill. Present, 14c per 100 lb.; proposed, $1.76 per ton of 2000 lb.

4245. **Sand and gravel**, usual minimum weight, from Aurora, Ill., to Galena Junction, Ill. Rates in cents per net ton. Present, combination basis; proposed, 113c.

4248. **Sand and gravel**, carloads (See Note 1), from Lincoln, Ill., to Flossmoor, Matteson, Monee and Peotone, Ill. Rates per ton of 2000 lb. Present, $1.26; proposed, $1.13.

4264. **Sand, gravel, sand and gravel pit strippings**, carloads, from Beloit, Janesville, After, Riton, Wis., and South Beloit, Ill., to Peotone, Ill. Rates per net ton. Present, $1.50; proposed, $1.

4265. **Sand, building and gravel**, carloads, from Chester, Ill.

To (representative points)	Rates per net ton Present	Proposed
Wolf Lake, Ill.	84	76
Herrin, Ill.	98	90
Carterville, Ill.	98	92

3630D. **Sand, gravel and crushed stone**, carloads (See Note 1), to Pinckneyville, Ill. (Rates in cents per net ton.)

From	Pres.	Prop.
Brookport, Cairo, Metropolis and Shetlerville, Ill.	108	100

4280. **Stone, ground or pulverized (in bulk), crushed** or rough quarried (in straight or mixed carloads), (See Note 3), but not less than 40,000 lb., from Krause, Ill., to Barnett, Ill. Present rate, 210c; proposed, 115c per ton of 2000 lb.

2565, Sub. 2. **Sand and gravel**, carloads, from Spring Valley, Ill. (rates in cents per ton of 2000 lb.):

To—	Present	Prop.
Ormonde, Ill.	Class rates	120
Ponemah, Ill.	Class rates	125
Smithshire, Ill.	Class rates	130

3805A. **Stone, ground or pulverized (in bulk)**, crushed or rough quarried, in straight or mixed carloads (See Note 3), but not less than 40,000 lb., from Krause, Ill., to Hoyleton, Ill. Present rate, 90c; proposed, 76c per net ton.

4293. **Crushed stone**, carloads (See Note 3), from White Bear, Mo., to points in Central Freight Association territory. Present, combination rates; proposed, Hannibal, Mo., rates.

4295. **Molding sand**, carloads (See Note 3), but not less than 40,000 lb., from Sand Cut, Ill. Rates per net ton.

To—	Pres.	Prop.
Gibson City, Ill.	$1.98	$1.51
Peoria, Ill.	2.50	1.51

TRUNK LINE ASSOCIATION DOCKET

17097. **Limestone screenings**, carloads (See Note 2), from Atlas, Hamburg and Lime Crest, N. J., to Pittstown, N. J., $1.50 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodity now in force to Newark, N. J., from same points as per L. & H. R. Ry., I. C. C. No. 1790.

17106 **Sand and gravel**, carloads (See Note 2), from sand shipping points in southern New Jersey on the Reading Co., P. R. R. and C. R. R. of N. J., to stations on the Reading Co., P. R. R. and B. & O. R. R. Statement of proposed rates will be furnished upon request. Reason—Proposal contemplates certain adjustments in sand and gravel rates from shipping points in southern New Jersey to various short-haul points in Pennsylvania and Delaware, and are fairly comparable with rates on like commodities, for like conditions, distances and services.

17117. **Ground limestone**, carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to Wallace Jct. to Queen Jct., Penn., inclusive; Jamisonville to Oneida, Penn., inclusive, 12c per 100 lb. Reason—To establish same rate as at present in force on agricultural lime between the same points, as per P. R. R. G. O.-I. C. C. 14567.

17121. **Sand**, other than blast, engine, foundry, molding and silica, **and gravel**, carloads (See Note 2), from Machias, N. Y., to Lockport, N. Y., $1.10 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from and to points in the same general territory as per Erie R. R. I. C. C. 17980, P. R. R. G. O. I. C. C. 13801 and B. R. & P. I. C. C. 8077.

17122. (A) **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, (B) **sand, blast, engine, foundry, molding, glass, silica, quartz or silex**, carloads (See Note 2), from Mapleton and Mill Creek, Penn., to Watsontown, Penn., (A) $1.25 and (B) $1.35 per ton of 2000 lb. Reason—To establish rates which will be comparable with those in force from Vineyard, McVeytown and Ryde, Penn., to Watsontown, Penn., as per P. R. R. G. O. I. C. C. 14553.

17131. **Agricultural**, land, chemical, gas or glass **lime**, carloads, minimum weight 30,000 lb., also **ground limestone**, carloads, minimum weight 50,000 lb. Proposed rates from Bellefonte and Pleasant Gap, Penn., to:

Tyrone Brick and Tile Co., Penn.	7½
Tilly Col. No. 2, Penn., to Bear Rock Col. No. 2, Penn.	8
End Martin Branch, Penn.	8
End Bens Creek, Penn.	8
Priscilla Col. No. 1, Penn., to Argyle Col. No. 1, Penn.	8
Seanor, Penn.	9

Rates in cents per 100 lb.

Reason—To establish rates which will be comparable with those in force to Altoona, Arrow and Henrietta, Penn., as per P. R. R. G. O. I. C. C. 14567.

17135. **Sand and gravel**, carloads (See Note 2), from Maxwells, N. Y., and Wadsworth, N. Y., to Silver Springs, N. Y., to Perry, N. Y., inclusive, $1.40 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates to Cohocton and Wallace, N. Y.

16578, Sup. 1. (A) **Sand**, other **than blast, engine, filter**, foundry, glass, molding, quartz, silica or silex, carloads; (B) **sand, blast, engine, filter, foundry, glass, molding, quartz, silica or silex**, carloads (See Note 2), from Freehold, N. J., to Bayside, N. J., inclusive, to Richwood, W. Va., (A) $5.20 and (B) $5.50 per ton of 2000 lb.

17154. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Safe Harbor, Penn., $1.60 per ton of 2000 lb. Reason—To establish rate which will be comparable with rate from Williamsport, Catawissa, Northumberland, Milton and Lewisburg, Penn., to Safe Harbor, Penn., as per P. R. R. G. O.-I. C. C. 13930.

17156. **Crushed stone**, carloads (See Note 2), from York, Penn., to Forest Hall, Md., $1.95 per ton of 2000 lb. Reason—Proposed rate is comparable with rates from York, Penn., to Brandywine, Md., to Hughesville, Md., inclusive, as per P. R. R. G. O.-I. C. C. 14541.

17161. (A) **Agricultural, land and fluxing lime**, carloads, minimum weight 30,000 lb.; (B) **ground limestone**, carloads, minimum weight 50,000 lb., from Thomasville, Bricklyn, York, Hanover, Bittinger and East York, Penn., to South Vineland and Millville, N. J., (A) 14c and (B) 13c per 100 lb. Reason—Proposed rates are comparable with rates in force to Bridgeton and Vineland, N. J., as per W. Md. I. C. C. 7770.

17209. **Ground flint and silica sand**, carloads (See Note 2), from Glen Morris and Glyndon, Md., to points on the B. & A. R. R., B. & M. R. R., and N. Y. N. H. & H. R. R., as per W. Md. I. C. C. 7358, 22½c per 100 lb. Reason—Proposed rates are same as now published by the B. & O. R. R. from Hancock-Berkeley Springs District as per B. & O. R. R. I. C. C. No. 21120.

17210. (A) Building lime, carloads, minimum weight 30,000 lb.; (B) **agricultural and land lime**, chemical, gas or glass lime, carloads, minimum weight 30,000 lb.; (C) **ground limestone**, carloads, minimum weight 50,000 lb.

Proposed Rates from Bellefonte, Penn.

To	(A)	(B)	(C)
Meyersdale, Penn.	12½	12	10
Rockwood, Penn.	11½	....	....
Somerset, Penn.	....	....	....
Boswell, Penn.	....	....	....
Jenner, Penn.	....	11	11
Jerome, Penn.	....	....	....
Johnstown, Penn.	....	....	....

Proposed Rates from Pleasant Gap, Penn.

To	(A)	(B)	(C)
Meyersdale, Penn.	12½	12	10
Rockwood, Penn.	11½	11	11
Somerset, Penn.	....	11	11
Boswell, Penn.	....	11	11
Jenner, Penn.	....	11	11
Jerome, Penn.	....	11	11
Johnstown, Penn.	....	11	11

Rates in cents per 100 lb.

Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory as per P. R. R. G. O. I. C. C. No. 14567 and B. & O. R. R. I. C. C. 21047.

17221. **Sand** (other than blast, engine, foundry, quartz, molding, silex or silica), carloads (See Note 2), from Temple, Penn., to Reading Co. stations, Bridgeport, Penn., to Pottsville, Penn., inclusive; Shainline, Penn., to Lykens, Penn., inclusive; Montello, Penn., to Donahrmore, Penn., inclusive; Milino, Penn., to Milton, Penn., inclusive; Oaks, Penn., to Vera Cruz, Penn., inclusive; Trap Rock, Penn., to Cossart, Penn., inclusive, rates ranging from 60c to $1.40 per ton of 2000 lb. Reason—Proposed rates are comparable with commodity rates on the above commodities from other shipping points on the Reading system to the same destinations.

17222. **Stone, crushed or quarry broken**, carloads (see Note 2), from Jamesville and Rock Cut, N. Y., to Gravesville, Poland, Newport, County Home and East Bridge, N. Y., $1.20, and Big Moose, N. Y., $1.50 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates from Jamesville, N. Y., to Herkimer and Remsen, N. Y.

17228. **Crushed stone**, carloads (See Note 2), from Auburn and Oaks Corners, N. Y., to Wellsburg, N. Y., $1.35 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in effect from LeRoy, N. Y., to Wellsburg, Belvidere and Portville, N. Y., and from North LeRoy, N. Y., to Bradford, Penn.

17241. **Sand and gravel**, carloads (See Note 2), from Kenvil and Springtown, N. J., to Bound Brook, N. J., 81c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodities from South Lakewood, N. J., to Jersey City, N. J., White Haven, Penn., to Scranton, Penn., and from Kenvil, N. J., to Easton, Penn., as per C. N. J. I. C. C. G2909.

17243. **Stone, crushed or quarry broken**, carloads (See Note 2), from Jamesville and Rock Cut, N. Y., to Middleville, N. Y., $1.20, and Salisbury Center, N. Y., $1.50 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates from Little Falls, N. Y., to Middleville, N. Y., and from Jamesville, N. Y., to Ingham and Dolgeville, N. Y.

17253. **Sand**, carloads (See Note 2), from Springtown, N. J., to Hellertown, Penn., 95c per ton of 2000 lb. Reason—To place shippers at Springtown, N. J., on a comparable basis with shippers located at Philadelphia, Penn. Proposed rate also compares favorably with rate from New Hope, Penn., to Bethlehem, Penn., as per C. N. J. I. C. C. 309.

17254. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from North East, Charlestown and Principio, Md., to Lincoln University, Penn., 90c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodity from and to points in the same general territory as per P. R. R. G. O.-I. C. C. 14212.

17255. **Broken stone**, carloads (See Note 2), from Port Deposit, Md., to Lebanon, Penn., $1.60 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Port Deposit, Md., to Reading, Penn., from Lenni, Penn., and Wilmington, Del., to Harrisburg, Penn., as per P. R. R. G. O.-I. C. C. 13960.

17261. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tulleytown, Penn., to Kulpmont, Penn., $1.85 per ton of 2000 lb. Reason—Proposed rates are comparable with rates from Philadelphia, Penn., and Baltimore, Md., and also compares favorably with rates from Morrisville and Tullytown, Penn., to Mt. Carmel, Penn., as per P. R. R. G. O. I. C. C. Nos. 13546, 14343 and 14628.

17262. **Sand, blast, engine, foundry, glass, molding, quartz, silex or silica**, carloads (See Note 2). To Gloucester, N. J., from the following New Jersey points:

	Proposed rate		Proposed rate
Masonville	69	Bordentown	104
Hainesport	69	Arch St., Palmyra,	
Mt. Holly	69	to Pavonia	81
Smithville	69	Collingswood	92
Birmingham	69	Marlton	92
S. Pemberton	69	Pomona	92
Crossley	115	Atlantic City	104
Old Bridge	161	Morrisville	112
Yardville	104	Tullytown	112

Rates in cents per ton of 2000 lb.

Reason—To establish rates which will be comparable with those in force to points of destination in the same general territory as Gloucester, N. J., as per P. R. R. G. O. I. C. C. 14628.

17007, Sup. 1. **Limestone, ground or pulverized, and stone dust**, carloads, minimum weight 50,000 lb., from Blakeslee, N. Y., to Inghams and Dolgeville, N. Y., $1.60, and Salisbury Center, N. Y., $1.70 per ton of 2000 lb.

17288. **Limestone, unburnt, ground or pulverized**, carloads, minimum weight 50,000 lb., to points in Agent Lowry's Tariff I. C. C. 146, taking 60% to 76% points, also points on the B. & O. R. R., Moundsville, Parkersburg, Ripley, W. Va., Bridgeport, Bellaire, Ohio, McKeesport, Butler, Erie, Penn., and points in that territory, from Alco, Carmine, Pountmours, Va., rates ranging from 13c to 33c per 100 lb., and from Riverton, Va., rates ranging from 10c to 30c per 100 lb. Reason—To place the plants at Alco, Carmine, Pountmours and Riverton, Va., on a comparable basis with plants located at Strasburg, Va., Martinsburg, W. Va., and Bellefonte, Penn., and other eastern points.

17299. **Crushed stone**, carloads (See Note 2), from Pennington, N. J., to Flemington, N. J., $1 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodity from and to points in the same general territory as per C. R. R. of N. J., I. C. C. G2961, Reading Co. J8504, and P. R. R. G. O.-I. C. C. No. 13940.

17302. **(A) Gravel and sand** (other than blast, engine, glass, molding, quartz, silex and silica). (B) **Sand, blast, engine, glass, molding, quartz, silex and silica**, carloads (See Note 2), from Montoursville, Penn., to Catawissa, Penn., (A) $1.25 and (B) $1.35 per ton of 2000 lb. Reason—Proposed rate is the same as from Montoursville, Penn., to Bloomsburg and Berwick, Penn., as per Reading Co., I. C. C. No. 145.

17309. **Stone (fluxing)**, carloads (See Note 2), from Atlas, Hamburg and Lime Crest, N. J., to Gloucester, N. J., $2.02 per ton of 2240 lb. Reason—Proposed rate is comparable with rates now in effect to Camden, N. J., and Philadelphia, Penn., as per L. & H. R. Ry., I. C. C. A1779.

17310. **Stone, natural** (other than bituminous, asphalt rock), **crushed**, N. O. I. B. N., carloads (See Note 2), from Santa Clara, N. Y., to Bloomingdale, N. Y., $1.40 per ton of 2000 lb. Reason—Proposed rate is comparable with rates on like commodities. from Chazy, N. Y., to Norwood and Lisbon, N. Y., as per D. & H. Co. 13705.

17312. **Ground limestone**, carloads, minimum mum weight 50,000 lb., from Buffalo, N. Y., to East Aurora, N. Y., 5c per 100 lb. Reason—Proposed rate compares favorably with rate from Buffalo, N. Y., to Lake View and Jewetville, N. Y., as per B. R. & P., I. C. C. 8044, and P. R. R., G. O. I. C. C. No. 14567.

17321. **Sand and gravel**, carloads (See Note 2), from Alfred, N. Y., to Garwoods and Swains, N. Y., $1 per ton of 2000 lb. Reason—Proposed rate is comparable with rates from Alfred, N. Y., to Moraine, N. Y., from Attica, N. Y., to Bliss, Eagle, and Gainesville, N. Y., as per Erie R. R., I. C. C. 17958.

17344. **Limestone, ground or pulverized, and limestone dust**, carloads, minimum weight 50,00 lb., from Jamesville, N. Y., to Rutland R. R. stations, Knapps to Bangor, N. Y., inclusive, $2.20; Malone to Burke, N. Y., inclusive, $2.30; Chatteaugay to Mooer's Forks, N. Y., inclusive, $2.50, and Champlain to Mooer's Jct., N. Y., inclusive, $2.60 per ton of 2000 lb. Reason—Proposed rate compares favorably with present rate from Jamesville, N. Y., to Plumadore, N. Y., Hoboken, N. J., Chatham and Rhinecliff, N. Y.

WESTERN TRUNK LINE DOCKET

3089G. **Limestone, ground**, carloads, minimum weight 40,000 lb., from Quincy, Ill., to Ft. Dodge, Iowa. Present rate, Class E, 20½c per 100 lb.; proposed, 14c per 100 lb.

853F. **Sand**, carloads, usual minimum, from Eggleston, Minn., to Detroit and Ecorse, Mich. Present, combination basis; proposed, $3.74 per net ton.

2051EE. **Rates, stone, crushed**, carloads, usual minimum weight, from Sioux Falls, Dell Rapids, S. D., and Pipestone, Minn., to Nebraska points. Present — Various rates. Proposed — Provide for rates based on the scale prescribed for joint hauls from Minnesota points to Fargo, N. D., under I. C. C. Docket 14068, 98 I. C. C. 366. The rates from both Dell Rapids and Sioux Falls, to be based on the average distance from those points to the Nebraska destinations. For example:

From Dell Rapids, S. D.

To—	Distance	*Average	Present	Proposed
Winside, Neb.	167.9	158	9	9
Wausau, Neb.	191.6	182	11	10
Emerson, Neb.	139.8	160	8½	9
Madison, Neb.	201.3	192	†16½	10

From Pipestone, Minn.

To—	Distance	*Average	Present	Proposed
Winside, Neb.	202	158	†13	10½
Wausau, Neb.	225	182	†14½	10½
Emerson, Neb.	174	160	†11	9½
Madison, Neb.	235.1	192	†17½	11

From Sioux Falls, S. D.

To—	Distance	*Average	Present	Proposed
Winside, Neb.	148.4	158	†12	9
Wausau, Neb.	172	182	10½	10
Emerson, Neb.	120.3	160	†10	9
Madison, Neb.	182	192	†16½	10

*Average distance from Dell Rapids and Sioux Falls, S. D.

†Combination rate.

All rates and distances based on Sioux City, Iowa.

1665C. Rates: **Stone, crushed** (See Note 3), from Hannibal and White Bear, Mo., to stations on C. B. & Q. R. R. in Iowa, of which the following are representative:

To—	Present, per 100 lb.	Proposed, per N. T.
Carson, Iowa	13½	$2.20
Griswold, Iowa	13½	2.20
Martensdale, Iowa	11	1.90
Knoxville, Iowa	12½	1.80
Tracey, Iowa	12½	1.70
Oskaloosa, Iowa	11	1.80
Fremont, Iowa	11	1.70
Brighton, Iowa	11	1.50
Winfield, Iowa	11	1.40
Yarmouth, Iowa	11	1.40

SOUTHWESTERN FREIGHT BUREAU DOCKET

13876. **Sand**, from points in Arkansas to points in Oklahoma. To establish the following rates in cents per 100 lb. on sand, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern, from and to points shown below:

	From—		
To	Guion, Ark. Rate	Ruddell, Ark. Rate	Calico Rock, Ark. Rate
Ada, Okla.	13½	12½	.....
Avant, Okla.	12	12	.....
Blackwell, Okla.	12½	12½	.....
Bristow, Okla.	12	12	.....
Chictoh, Okla.	12	12	.....
Dewar, Okla.	12½	12	.....
Henryetta, Okla.	12½	12	.....
Muskogee, Okla.	11	11	.....
Okmulgee, Okla.	12	12	.....
Pawhuska, Okla.	12	12	.....
Sand Springs, Okla.	11	11	.....
Sapulpa, Okla.	12	11	.....
Shopton, Okla.	12	12	.....
Tulsa, Okla.	11	11	.....
Oklahoma City, Okla.	12½	....	.....
Bartlesville, Okla.	11	....	10½

Proponent contends that there is no justification for continuing higher rates from Arkansas and Oklahoma points than on basis of the 9702 scale.

13878. **Sand and gravel**, from points in Kansas to points in Missouri. To establish a rate of 8c per 100 lb. on sand and gravel, carloads (See Note 3). In no case shall the minimum weight be less than 40,000 lb., from Lawrence and Shockey, Kan., to points shown below: To Chat Jct., Athletic Spur, Princess Spur, Byrd Spur, Joplin, Saginaw, Tipton Ford, Neosho, McElhaney, Goodman, Eliff, Anderson, Lanagan, Elk Springs, and Noel, Mo. It is desired to extend the application of current rates now applicable under order of the Interstate Commerce Commission in Docket 15715 to also apply to points shown above.

13942. **Sand**, from points in Kansas to points in Kansas and Missouri. To establish the following rates in cents per 100 lb. on sand, carloads (See Note 3), but in no case the minimum weight to be less than 60,000 lb. from and to points shown below:

To—	From Shockey, Kan. Rates	From Lawrence, Kan. Rates
Merriam, Kan.	.....	4½
Lenexa, Kan.	.....	4½
Lackmans, Kan.	.....	4½
Olathe, Kan.	.....	5
Bonita, Kan.	.....	6
Ocheltree, Kan.	.....	6
Springhill, Kan.	.....	6
Hillsdale, Kan.	.....	6
Paola Water Works, Kan.	.....	6
Paola, Kan.	.....	6
Henson, Kan.	.....	6
Fontana, Kan.	.....	6
La Cygne, Kan.	.....	6
Boicourt, Kan.	6	6
Thirlwell Mine, Kan.	.....	6½
Pleasanton, Kan.	.....	6½

	From Shockey, Kan. Rates	From Lawrence, Kan. Rates
Linton, Kan.	.....	6½
Prescott, Kan.	.....	6½
Fulton, Kan.	.....	6½
Standard, Kan.	6½	6½
Hammond, Kan.	6½	7½
New Cement Works, Kan.	.....	7½
Scott Junction, Kan.	.....	7½
Ft. Scott, Kan.	7½	7½
Edward, Kan.	7½	7½
Garland, Kan.	7½	7½
Arcadia, Kan.	7½	7½
Konantz, Kan.	7½	7½
Clemens No. 21, Mo.	7½	7½
Last Chance, Mo.	7½	7½
Reber, Mo.	8	8
Buchert, Mo.	8	8
Liberal, Mo.	8	8
Liberal Brick Plant, Mo.	8	8
Vincent, Mo.	8	8
Wimmer, Mo.	8	8
Iantha, Mo.	8	8
Lamar, Mo.	8	8
Kenoma, Mo.	8	8

In order to compete with other Kaw valley points it is desired to establish rates from Lawrence and Shockey, Kan., to destinations in Kansas and Missouri shown above, based 1c over present Kansas City, Mo., rates (which is the general basis from this territory)—except where necessary account of departures, Lawrence, Kan., rate to appl yas maximum from Shockey, Kan.

Dallas Rate Hearing on Sand, Gravel and Stone

AT the hearing at Dallas, Texas, before Examiner Waters, a 20% reduction in rates in southwestern states on sand and gravel was asked by shippers and representatives of the state highway commissions of Texas and Oklahoma. Testimony was given by shippers to show that present rates were excessive and retarding the proper development of road building in the Southwest. They seek a reduction in both the intrastate and interstate rates by the application of a uniform rate scale for the territory covering these building materials. If the uniform rate is put into effect it will act to increase the Louisiana intrastate rate, however, it was explained.

Clark B. Mandigo, state highway engineer for Oklahoma, was one of the chief witnesses, testifying that 45% of the cost of road building was for materials and that the freight rate paid on these materials was therefore a large element in the cost of road building. He explained that the highway commission of Oklahoma spent annually about $8,000,000 in new roads.

C. B. Bee, rate expert, and W. C. Lewis, assistant attorney general of Oklahoma, assisted in presenting testimony.

Commissioners Lon A. Smith and C. V. Terrell of the Texas Railroad Commission sat with Examiner Waters. Commissioner A. D. Beals of the Arkansas Railroad Commission and Commissioner L. J. Shorer of the Louisiana Public Service Corporation were also in attendance.

Carriers' rebuttal testimony was given by C. P. Rauch, Kansas City, on behalf of the Kansas City Southern Railroad.

Southern Cement Rates

A COMPLETE system of interstate rates on cement, effective not later than April 14, 1928, has been prescribed for application into and within southern territory. No finding has been made in respect of intrastate rates. Relief has been granted in fourth section order No. 9674, so as to enable the circuitous routes and weak and short railroads to meet the competition of the short routes.

The rate order resulted from a protest by the cement industry and was applied because the commission found that the present structure in the Southeast was unreasonable in its application both to consumers and shippers.

Under the order, rates on cement moving in the Southeast or shipped there from the North will be based on a mileage scale. This prescribed scale is given below:

DISTANCE SCALE PRESCRIBED, IN CENTS PER 100 LB.

(For application in connection with a carload minimum weight of 50,000 lb. subject to marked capacity of car, but not less than 40,000 lb.)

Distance	Rate Cents
5 miles and less	4
10 miles and over 5	5
15 miles and over 10	6
20 miles and over 15	7
30 miles and over 20	8
40 miles and over 30	8.5
50 miles and over 40	9
60 miles and over 50	9.5
70 miles and over 60	10
80 miles and over 70	10.5
90 miles and over 80	11
100 miles and over 90	11.5
120 miles and over 100	12
140 miles and over 120	12.5
160 miles and over 140	13
180 miles and over 160	13.5
200 miles and over 180	14
220 miles and over 200	14.5
240 miles and over 220	15
260 miles and over 240	15.5
280 miles and over 260	16
300 miles and over 280	16.5
320 miles and over 300	17
340 miles and over 320	17.5
360 miles and over 340	18
380 miles and over 360	18.5
400 miles and over 380	19
420 miles and over 400	19.5
440 miles and over 420	20
460 miles and over 440	20.5
480 miles and over 460	21
500 miles and over 480	21.5
520 miles and over 500	22
540 miles and over 520	22.5
560 miles and over 540	23
580 miles and over 560	23.5
600 miles and over 580	24
620 miles and over 600	24.5
640 miles and over 620	25
660 miles and over 640	25.5
680 miles and over 660	26
700 miles and over 680	26.5
720 miles and over 700	27
740 miles and over 720	27.5
760 miles and over 740	28
780 miles and over 760	28.5
800 miles and over 780	29
820 miles and over 800	29.5
840 miles and over 820	30
860 miles and over 840	30.5
880 miles and over 860	31
900 miles and over 880	31.5
920 miles and over 900	32
940 miles and over 920	32.5
960 miles and over 940	33
980 miles and over 960	33.5
1000 miles and over 980	34
1020 miles and over 1000	34.5
1040 miles and over 1020	35
1060 miles and over 1040	35.5
1080 miles and over 1060	36
1100 miles and over 1080	36.5
1120 miles and over 1100	37
1140 miles and over 1120	37.5
1160 miles and over 1140	38
1180 miles and over 1160	38.5
1200 miles and over 1180	39
1220 miles and over 1200	39.5
1240 miles and over 1220	40
1260 miles and over 1240	40.5
1280 miles and over 1260	41
1300 miles and over 1280	41.5
1320 miles and over 1300	42
1340 miles and over 1320	42.5
1360 miles and over 1340	43
1380 miles and over 1360	43.5
1400 miles and over 1380	44
1320 miles and over 1400	44.5
1440 miles and over 1420	45
1460 miles and over 1440	45.5
1480 miles and over 1460	46
1500 miles and over 1480	46.5

The commission said that the general effect of the new schedules would be a reduction, though the exact amount of reduction granted could not be estimated because of the new principle laid down in schedules.

In shipments to and from points in the Florida peninsula, the southeastern mileage rate laid down will govern charges, but in addition railroads were allowed to add certain arbitrary amounts to these schedules in order to compensate for higher operating costs in that territory. The arbitraries found reasonable are:

ARBITRARIES FOUND REASONABLE FOR APPLICATION TO AND FROM POINTS IN THE FLORIDA PENINSULA

(Arbitraries are in cents per 100 lb.)

Distance	Arbitrary Cents
10 miles and less	1
20 miles and over 10	1.5
60 miles and over 20	2
100 miles and over 60	2.5
180 miles and over 100	3
260 miles and over 180	3.5
340 miles and over 260	4
420 miles and over 340	4.5
500 miles and over 420	5
Over 500 miles	5.5

Rates prescribed for the future, according to the report, are based on a scale higher than Western Cement Scale II, but somewhat lower, in general, than Western Cement Scale III, subject to a minimum of 50,000 lb., except when, for the carriers' convenience, cars of lesser capacity are furnished.

Reparation notwithstanding that this is a general readjustment of cement rates to and within southern territory, has been awarded on shipments from Security, Md., to destinations in Virginia, the Carolinas, Georgia, and Tennessee, on a basis higher than that prescribed for the future.

The report covers, in addition to the title complaint, a sub-number thereunder, Alpha Portland Cement Co. vs. Ashland Coal and Iron Railway; No. 15900, Security Cement and Lime Co. vs. Aberdeen & Rockfish et al., and a sub-number thereunder, Tidewater Portland Cement Co. vs. Aberdeen & Rockfish et al.

Violations of the first three and the thirteenth sections were alleged in the leading complaint. The long-and-short-haul part of the fourth section was also alleged to have been disregarded in the making of the assailed rates. The allegations in the other complaints closely followed those in No. 15806, but that the destination territories were not so extensive. The title complaint covered all the states wholly in southern territory and Virginia and Kentucky as well, parts of which are not in southern territory.

Award of reparation to the Security Cement and Lime Co., one of the complainants, is probably the feature that distinguishes this from any of the general readjustments of rates that have been made in recent years.

John Herzog

JOHN HERZOG, 69, senior member of John Herzog and Son, died at his home in Forest, Ohio, on December 16, 1927.

Mr. Herzog was one of the pioneer lime manufacturers of Ohio having spent his entire life from boyhood in the industry. In

John Herzog

his early years he was engaged in the cut stone industry, following the stone-cutters trade which he learned as a boy. In 1898, he located at Tiffin, Ohio, and started a company for the production of lime and crushed stone for road construction and fluxing purposes. The present company is an outgrowth of the early organization and has been for many years regarded as one of the leading lime manufacturing companies of Ohio and remains as a fitting tribute to its organizer, John Herzog.

Mr. Herzog is survived by his widow and one son, Bert, who became associated with his father in the business about 20 years ago and will continue the management of the business along lines identical with its past conduction.

Priddy Co. to Enlarge Land Plaster Plant

CHARLES W. PRIDDY AND CO., INC., the oldest manufacturer of land plaster in Norfolk, Va., has recently contracted for an enlargement of its factory at Money Point, Norfolk county.

The building for the enlargement is already complete and the cement foundations for the new machinery will be laid within a short time. It is estimated that the foundations and new machinery will cost between $40,000 and $50,000. The change will include the most modern machinery used for the grinding of gypsum rock, from which land plaster is made. It will take from 50 to 75 men to operate the plant, which will be capable of an output of 500 tons a day.

Land plaster is used on the peanut crop grown in Virginia and North Carolina. The demand for it only comes during the season from June 15 to about August 1, so that the entire volume must be shipped during June and July. The new plant will be ready to operate early in 1928, but will not start until about May 1. Mr. Priddy declares that the new plant will be able to supply most of the demand of Virginia and North Carolina.—*Norfolk* (Va.) *Pilot.*

Stewart Sand Co. Brings Out New Ready-Mixed Mortar

THE Stewart Sand Co. of Kansas City, Mo., recently announced in their publication, *Better Building,* a new product in the Blue Diamond line. The new product is a ready mixed cement mortar which may be retempered, requires no "cutting in" of additional cement on the job and is very rich and plastic. The cementing ingredients of this mortar are Carney and Fort Scott bricklayers cements, both of which are well known among builders. While these materials have been in use for a number of years, it has not heretofore been possible to produce an entirely satisfactory and finished mortar from them as a ready mixed product, according to the statement issued in the Stewart company's house organ. The new mortar has already been used on several large structures in Kansas City.

Florida Flint Rock Association Formed

AT a meeting of Florida flint rock manufacturers held in Ocala, Fla., on November 5, the Florida Flint Rock Association was formed and the following officers elected, namely: A. T. Thomas, president; A. A. Griffin, vice-president, and W. V. Newsom, secretary and treasurer. The object of the association is to promote the use of flint rock for road building and concrete purposes. Meetings of the association will be held from time to time to discuss ways and means of popularizing the product and it is expected a vigorous campaign will be mapped out to bring the merits of flint rock to the attention of road builders and others who use concrete.

Florida Rock Products Co. in Bankruptcy

THE Florida Rock Products Co. of Brooksville, Hernando county, Fla., is now in bankruptcy, and the property of the company will be disposed of in a short time. This company operated a limestone quarry and crushing plant near Brooksville, a description of which was in the June 26, 1926, issue of ROCK PRODUCTS. L. L. Buchanan, of the firm of Buchanan & Crowder, realtors of Tampa, Fla., is now trustee for the company.

Independent Gravel Co. Leases Missouri Quarry

THE Independent Gravel Co. of Joplin, Mo., has leased the quarries of the Marblehead Lime Co., at White Bear, Mo., located on the C., B. & Q. R. R. between Hannibal and Withers Mill, and will engage in the manufacture of whiting and crushed limestone.

The gravel company expects to spend a very large sum in thoroughly equipping the plant for the manufacture of whiting and other products. The installation of rock crushers and other equipment has already been started, and it is hoped that the plant will be in production early in the spring.—*Hannibal* (Mo.) *Post.*

North American Cement Co. Plans Improvements

CONTRACTS were recently awarded for improvements to the plant of the North American Portland Cement Co. of Albany, N. Y., at Security, Md., near Hagerstown. The North American company recently acquired the Security Lime and Cement Co., and at present the mill is being operated in the name of that company. The expansion program calls for the expenditure of more than $600,000, including building construction and machinery.

Waste heat equipment is being supplied by the Edge Moor Iron Co., Edge Moor, Del., the Foster-Wheeler Corp., New York City, and the Greene Fuel Economizer Co., Beacon, N. Y. The building construction and concrete work is being handled by J. B. Ferguson Co., Hagerstown. Electrical equipment is being supplied by the General Electric Co., Schenectady, N. Y., and condensing equipment by the Worthington Pump and Machinery Corp., Harrison, N. J., and New York City. All piping will be supplied by the W. K. Mitchell Co. of Philadelphia, Penn.

Northern Pacific to Build Gravel Washing Plant in Montana

ANNOUNCEMENT was made recently that the Northern Pacific Railroad will commence work early in the spring on a new gravel pit and gravel washing plant at Horton, Mont., 10 miles west of Miles City, Mont. The new plant will have an annual capacity of 60,000 cu. yd. and will cost about $120,000. The railroad company will spend $50,000 in trackage, and the washing plant will cost $70,000. The Pioneer Sand and Gravel Co. will operate the plant.

The Horton plant will make the sixth of such plants serving the Northern Pacific in carrying out its washed gravel ballast campaign. The company for four years has been treating sections of its roadbed with washed gravel.—*Anaconda* (Mont.) *Standard.*

Announcing a Series of Articles on Lime Manufacture

WE are accustomed to consider the United States as the leading industrial nation of the world. We are in the habit of believing that our European contemporaries have much more to learn about *our* way of doing things than we have to learn about theirs. The last few years have tended to increase our faith in these beliefs because we have had visitors from nearly every nation abroad to observe and study our industries—and the rock products industry has been no exception.

But for a long time we have had some misgivings as to our supremacy in the lime industry. Germany, for example, with a much smaller territory and population, has an annual consumption of lime almost as much as the United States. Moreover, we had every reason to believe lime is manufactured much more economically and efficiently in Europe than in this country.

There was only one way to verify our beliefs and to serve the American lime industry as a faithful journal dealing with that industry should serve it. We must make a thorough-going study and investigation of the lime industry in Europe.

Fortunately we were able to interest the one man in the United States best able and prepared to make such a study—Victor J. Azbe, of St. Louis, Mo. Mr. Azbe is already known to every progressive lime manufacturer because of his contributions to our knowledge of lime and lime manufacture. He is an outstanding engineer who has specialized many years on problems of fuel burning and the efficiency of fuel-burning equipment. Realizing that efficient fuel burning—the most lime for the heat energy consumed—was the key problem of the lime industry, a few years ago, Mr. Azbe turned much of his interest and attention to the lime industry. Since then he has made important and outstanding contributions to the lime industry, both as a whole, and in solving the problems of individual manufacturers.

So last July Mr. Azbe left New York for Europe, armed with a speaking and reading knowledge of German and other European languages, with letters of introduction to the principal lime manufacturers of Germany and other countries, and with letters to the European representatives of many of Rock Products' advertisers. For more than two months he studied the lime industry of Germany and other countries most intensively, and was able to draw some very interesting and valuable conclusions: We *are* behind Europe in lime manufacturing technique; just where and how and why Mr. Azbe will explain to Rock Products readers in a series of articles beginning with the January 21 issue, which we are certain will furnish much valuable information to the entire lime industry.

Victor J. Azbe's career is interesting and inspiring. He was born in Laibach, in what is now the kingdom of Jugo-Slavia. At 17 years of age he emigrated to the United States. He started in at once to earn his living and acquire a technical education under the most discouraging auspices. To-

Victor J. Azbe

day he is a member of many engineering and scientific societies and a nationally recognized authority in the field of combustion engineering.

Mr. Azbe maintains one of the finest private research laboratories in America, and there he has carried out, and is continuing investigations as to the nature of limestone and lime, which place him in a class almost by himself in the lime industry. Much research has been done on uses of lime, but very little on its manufacture, and the nature of the physical and chemical problems involved in the operation of a lime kiln.

Reliance Rock Products Co. Building Plant Near Los Angeles

WORK is nearing completion on the $50,000 plant of the Reliance Rock Products Co. at Sawtelle, Calif., near Los Angeles. It is expected that the new plant will begin operating during January. The pit is already completed and the switch track into the plant is under construction. Work on the construction of the bunkers is well under way. There will be ten bins specially equipped for ease in unloading and loading cars or trucks. Six hundred feet of trackage on the Pacific Electric freight line will make it possible to handle 15 cars of rock or sand at one time.

The plant will be used for distribution of rock and sand throughout the Sawtelle area, including Westwood, the new university site, and many sections of the bay district. Recent growth of this territory and the erection of thousands of new homes is said to have created a big demand for rock products.—*Los Angeles* (Calif.) *Times.*

Certainteed Products Co. Sells Gravel Interests in Michigan

IN a deal involving expenditure of $100,000, the Grand Rapids Gravel Co., Grand Rapids, Mich., purchased from the Certainteed Products Co., New York, its gravel business in the Grand Rapids district. The transfer includes purchase of a gravel pit of nearly 300 acres in Wyoming township, Mich.

The Grand Rapids Gravel Co. plans to put up a modern gravel plant immediately. The plant, to cost about $50,000, will handle "batch deliveries." It will have facilities for washing and preparing sand and gravel by the latest methods. The property, which has trackage on the Pere Marquette railway for car delivery, is considered one of the last remaining large deposits of gravel in the immediate vicinity of Grand Rapids.—*Grand Rapids* (Mich.) *News.*

Henry S. Spackman

LIEUT.-COL. HENRY S. SPACKMAN, 61, former president of the engineering company which bore his name, and now the E. L. Conwell Co., Philadelphia, died on December 21. Col. Spackman began his professional career with James W. Queen Co., Philadelphia. He was then successively employed by the Pennslyvania Railroad, on building construction for the state of Pennslyvania, by the Philadelphia Department of Public Works and by James H. Windrim as constructing engineer. In 1896 he helped organize and was a member of the firm of Lathbury & Spackman, which later became the Henry S. Spackman Engineering Co., engineers and consultants in physical and chemical analyses of structural materials.

Col. Spackman is best remembered in the rock products industry for his contributions to the manufacture of alumina cements, his patents being generally regarded as among the first to be granted in the United States for its manufacture. In fact, some of his inventions have been in successful use at one of the large cement manufacturing companies since their innovation.

During the World War, Col. Spackman served as chief of the cement section and as technical adviser to the Peace Commission.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	.....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	.....
Dundas, Ont.	.30	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@1.00	1.35@1.50	1.15@1.50	1.10@1.15	1.05@1.10	1.05@1.10
Ft. Spring, W. Va.	.50	1.45	1.35	1.25	1.20	.....
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@ .60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	.....
Rochester, N. Y.	1.50	1.50	1.50	1.50	1.50	1.50
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.50	.50	.50	.50	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Chasco, Ill.	1.00@1.30	.....	1.00@1.15	.....	1.00@1.15	.....
Columbia and Krause, Ill.	.90@1.20	.90@1.20	1.00@1.20	1.00@1.20	1.00@1.20	1.25
Dubuque, Iowa (e)	.75	1.20@1.30	.....	1.20@1.30	1.20@1.25	.....
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa (f)	1.10	1.55	1.55	1.55	.....	.....
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	.....
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.30	1.20	1.00	.....
St. Vincent de Paul, Que.	.75	1.35	1.20	1.00	1.00	1.15
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Valmeyer, Ill. (fluxing limestone)	.90@1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.90	.90	.90	.90	.90	.....
Wisconsin Points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	.....	2.65	2.65	2.40	2.00
Cartersville, Ga.	1.50	1.65	1.65	1.35	1.15	.....
Chico and Bridgeport, Tex.	1.00	1.30	1.25	1.20	1.05	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Graystone, Ala.			Crusher run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, $1 per ton			
Ladds, Ga.	.....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.25	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.15	1.15	1.15	1.15	1.15	1.15

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.00	1.75	1.55	1.25	1.25
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	.....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.40	1.80	1.60	1.40	1.40	.....
Oakland and El Cerito, Calif.	1.00	1.00	1.00	.90	.90	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
San Diego, Calif.	.50@ .75	1.25@1.50	1.25@1.50	1.10@1.25	1.10@1.25	.....
Springfield, N. J.	1.60	2.20	2.10	1.70	1.60	.....
Toronto, Ont.	.....	3.58@4.05	3.05@3.80	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Columbia, S. C.	.....	.....	2.00	1.80	1.65	.....
Eastern New York—Syenite	.75	1.25	1.25	1.25	1.25	1.25
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.			Crushed flint rock, 2.50 per cu. yd.			
Graystone, Ala.—Granite	.50	.....	.....	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Rochester, N. Y.			Dolomite, all sizes, 1.50 per ton			
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	.....	.....	1.40	1.25	1.25	1.25

(a) Sand. (b) to ⅜ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¾ in., 1.35. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh 4.50
Atlas, Ky.—90% thru 100 mesh 2.00
50% thru 100 mesh 1.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh 1.00

Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh 1.50

Cartersville, Ga.—90% thru 4 mesh 1.50

Charleston, W. Va.—Marl, per ton, bulk 3.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk 2.50

Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh 2.25

Cypress, Ill.—90% thru 100 mesh 1.35

Ft. Spring, W. Va.—50% thru 50 mesh 1.00

Hartford, Conn.—Paper bags, 4.25; cloth bags, 4.75; bulk 3.25

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95
Bulk 2.70

Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk 2.75

Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh 3.50

Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk 2.70

Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh 1.50@ 2.75

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk 3.50

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk, 1.75; bags 3.75
Marl—Analysis, 90% $CaCO_3$; 10% $MgCO_3$; bulk, 2:25; bags 4.00

Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton 2.00

Middlebury, Vt.—Analysis, 90.05% $CaCO_3$; 90% thru 50 mesh 6.00

Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk 1.35@ 1.60

Olive Hill, Ky.—90% thru 4 mesh 1.00

Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100 2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk 3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk 2.00

Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk 2.75
2.25

Toledo, Ohio—30% thru 50 mesh

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk 3.25
Carload, 7.50; less than carload 9.00

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh 3.00
Atlas, Ky.—90% thru 4 mesh 1.00

Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5%; $MgCO_3$; 90% thru 10 mesh 1.50
Brandon, Vt.—Bulk 4.00

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh 3.50

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80

Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 100% thru 4 mesh ..... 1.10@ 1.50

Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.35

Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk 3.25

Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00

Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50

Kansas City, Mo.—50% thru 100 mesh 1.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00

Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60

Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh ..... 1.85@ 2.35

McCook, Ill.—90% thru 4 mesh ..... .90

Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh 1.50

Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Mountville, Va.—Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags 5.00

Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25

50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65

River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40

Stone City, Iowa—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25

Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh 2.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00

Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh; paper bags 3.50

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks 4.25

Piqua, Ohio, sacks, 4.50@5.00; bulk ..... 3.00@ 3.50

Rocky Point, Va.—85% thru 200 mesh, bulk ..... 2.25@ 3.50

Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Buffalo, N. Y. ..... 2.00@ 2.50

Cedarville and S. Vineland, N. J. 2.25

Estill Springs and Sewanee, Tenn. 1.50

Gray Summit and Klondike, Mo. ..... 1.75@ 2.00

Klondike, Mo. 2.00

Los Angeles, Calif.—Washed 5.00

Massillon, Ohio 3.00

Mendota, Va. ..... 2.25@ 2.50

Michigan City, Ind. ..... .35

Mineral Ridge and Ohlton, Ohio 2.50

Oceanside, Calif. 3.00

Ohlton, Ohio 2.50

Ottawa, Ill. 1.25

Pittsburgh, Penn. ..... 3.00@ 4.00

Red Wing, Minn. 1.50

Rockwood, Mich. ..... 2.75@ 3.25

Round Top, Md. 2.00

San Francisco, Calif. ..... 4.00@ 5.00

Silica, Va. ..... 2.00@ 2.50

St. Louis, Mo. 2.00

Sewanee, Tenn. 1.50

Utica and Ottawa, Ill. ..... .75@ 1.00

Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Chippewa Falls, Wis.		.25*
Columbus, Ohio		.15@ .30
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@ 1.00

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Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Asbury Park, Spring Lake and Wayside, N. J.	.80	.70	1.25	1.50		
Attica and Franklinville, N. Y.	.95	.95	.95	.95	.95	.95
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.		1.00*		1.50*	1.75*	
Leeds Junction, Me.		.50	1.75		1.25	1.00e
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.90	.85	.75	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.25@ .80	.50@ .70	.10@ .40	.50@ .70	.60@ .80	.60@ .80
Barton, Wis.		.55	.75	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio		.75	.75	.75	.75	
Des Moines, Iowa		.30	1.30	1.30	1.30	1.30
Eau Claire, Chippewa Falls, Wis.	1.00	.50	.65	1.05	.95	
Elkhart Lake, Wis.	.60	.40	.60	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00	1.00	1.00	
Hersey, Mich.		.50		.70		.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60	.75	.75	.75	.75
Joliet, Plainfield & Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.				1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .50	.40@ .50	1.40	1.35	1.25	
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.85	.80	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.25	1.15
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Brewster, Fla.	.45	.45	2.75	2.50		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Chattahoochie River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.50	.50				
New Martinsville, W. Va.	1.00	.90@1.00		1.30@1.40		.80@ .90
Roseland, La.	.25	.15	1.25	.85	.65	
WESTERN:						
Kansas City, Mo.		.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Phoenix, Ariz.		1.00*	2.00*	2.00*	1.10*	1.00*
Pueblo, Colo.	.70	.60		1.20		1.15
San Diego, Calif.		.40@ .50	.80@1.00	.80@1.00	.65@ .80	.65@ .80
Seattle, Wash.	1.25	1.25	1.25	1.25	1.45	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			.60
Brookhaven, Miss.						.85
Buffalo, N. Y.	1.10	.95		.85		
Burnside, Conn.	.75					
Des Moines, Iowa	.50					
Dresden, Ohio	.50	.60	.70	.65	.65	.60
East Hartford, Conn.	.85*d					
Eau Claire, Chippewa Fls., Wis					.65	
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas			1.10		.55	
Macon, Ga.	1.25‡					
Mankato, Minn.	.30					
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.					.50	
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Winona, Minn.	.60	.60	60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramec River.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.00	2.00	2.00@2.25	1.50		4.00	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75	1.75		1.75	1.75@2.00		
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Cedarville and S. Vineland, N. J.				2.25			
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	
Dresden, Ohio	1.50@1.75	1.35@1.50	1.50@1.75	1.25	1.35		
Eau Claire & Chippewa Falls, Wis. (e)						3.00	3.00
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Klondike, Mo.				2.00	2.00		2.00
Massillon, Ohio	2.25	2.25		2.25	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30@ .35			
Millville, N. J.				1.75b		3.50	
Montoursville, Penn.				1.35@1.60			
New Lexington, O.	1.75	1.25					
Ohlton, Ohio	1.75b	1.75b		2.00b	1.75b	1.75b	
Ottawa, Ill.						3.50	
Red Wing, Minn. (d)					1.50	3.00	1.50
Round Top, Md.				1.60		2.25	
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Va.	Ground glass sand, 140-mesh, per ton, 8.00@10.00						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.00	1.75*@2.00	1.75	1.75*@2.00	1.75		
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.00			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio	2.05*	1.05*	1.55*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.00	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95[4]
Chazy, N. Y.		8.50	7.50	10.00		15.50[1]	8.50	14.00
Lime Ridge, Penn.					5.00[2]			
Pittsburgh, Penn.	12.50	8.50	8.50		9.00	11.00		
West Stockbridge, Mass.	12.00	10.00	5.60				6.00	2.00[12]
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65[7]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		9.00		8.00	1.50
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	11.50	8.50	8.50		9.00	11.00		
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio[6]	11.50							
Milltown, Ind.		8.50@10.00		10.00[3]			8.50[22]	1.35[10]
Scioto & Marble Cliff, O.		8.50	8.50	8.50	8.25	.62½	7.50	1.50[23]
Sheboygan, Wis.		11.50			9.50			2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	8.50	8.50	12.50	9.00	11.00[9]	9.00	1.50[3]
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Frederick, Md.		9.00	9.00	9.50	7.50	9.00	7.50	9.00
Graystone, Ala.	12.50	10.00		12.50		1.40[24]	8.50	1.50
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	20.25	9.00@10.00	9.00	9.00			8.50	1.50
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.		11.50	10.00				12.00	1.30
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Cirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50[8]	1.50[22]
San Francisco, Calif.	20.00	20.00	13.50	21.00			14.50[20]	2.15
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[11]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65. [8] To 11.00 [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00 [12] To 3.00. [13] Delivered in Sothern California. [14] Per 2 bags of 90 lb. each. [22] To 9.00. [23] To 1.60. [20] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.10
Ohlton, Ohio	*1.75@ 2.00	*1.75
Red Wing, Minn.		1.00
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel crayons, gross	1.00@ 2.80
Chatsworth, Ga.:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh)	10.00
Pencils and steel crayons, per gross	1.50
Chester, Vt.:	
Ground talc (150-200 mesh), paper bags	9.00@10.00
Same, burlap bags, bags extra	8.00@ 9.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc (for grinding)	5.00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Glendon, N. C.:	
Ground talc (150-200 mesh), bulk	6.00@10.00
Ground talc (150-200 mesh), bags	8.00@14.00
Pencils and steel crayons, gross	1.05@ 2.00
Blanks, .08 per lb.; cubes	50.00
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Herry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bags	9.50@14.50
Joliet, Ill.:	
Crude talc	5.00
Southern talc	17.00
Illinois talc	10.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock	
Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-68%	3.75@ 4.25
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee—F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00
Ground Rock (2000 lb.)	
Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72.5%	9.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida—F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12
Cut mica—50% from Standard List.	

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.— All colors and sizes	§3.00	§3.00
Buckingham, Que.—Buff stucco dash	.....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries	.....	17.50
Crown Point, N. Y.— Mica spar	.....	9.00@10.00
Dayton, Ohio	.....	6.00@24.00
Easton, Penn.— Green stucco	.....	12.00@18.00
Green granite	.....	14.00@20.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash	.....	10.00@20.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	5.50@ 7.50
Milwaukee, Wis.	.....	14.00@34.00
New York, N. Y.—Red and yellow Verona	.....	32.00
Phillipsburg, N. J.— Royal green granite	.....	15.00@17.00
Randville, Mich.— Crystalite crushed white marble, bulk	4.50@ 6.00	4.50@ 7.50
Rose pink granite, bulk	.....	12.00
Stockton, Calif.—"Natrock" roofing grits	.....	12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	.....
Wauwatosa, Wis.	.....	20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 17.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Bristol, Tenn.—Color, white; analysis, K_2O, 6 to 10%; Na_2O, 2½ to 4%; SiO_2, 68 to 78%; Fe_2O_3, 12 to 20%; Al_2O_3, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade	14.50@18.00
Brunswick, Me.—Color, white; 99% thru 140 mesh, bulk	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; crude, bags, 12.25; bulk	11.05
Pulverized, 95% thru 200 mesh; bags, 19.73@22.00; bulk	18.73@20.70
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk	18.00
Crude	9.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
Crude, bulk	9.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Brandon, Vt.	10.00
Cartersville, Ga.—(Limestone), per bag	2.25
Centerville, Iowa—(Gypsum), per ton	18.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.—(Limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton	15.00
Gypsum, Ohio—(Gypsum), per ton	10.00
Hartford, Conn.	‡7.50@*9.00
Limestone, Wash. — (Limestone), per ton	12.50
Los Angeles, Calif.	18.55
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	10.00
Warren, N. H.—(Mica), per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone), bulk	‡7.50@*9.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	9.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	16.00
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	12.75@16.50‡
New Brighton, Minn.	10.00
Pontiac, Mich.	19.75
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	16.00*†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	14.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M., 10 days. ‡L.C.L.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¾	3.47
Atlanta, Ga.	.....	2.35
Baltimore, Md.	.....	2.15@2.25
Birmingham, Ala.	.....	2.10
Boston, Mass.	.....	2.13@2.23
Buffalo, N. Y.	.....	2.20@2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.24
Charleston, S. C.	.....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.....	2.23
Cleveland, Ohio	.....	2.24
Chicago, Ill.	.51¼	2.05
Columbus, Ohio	.57¼	2.29
Concrete, Wash.	.....	2.35
Dallas, Texas	.....	2.00
Davenport, Calif.	.....	2.45*
Davenport, Iowa	.....	2.24
Dayton, Ohio	.58¼	2.33
Denver, Colo.	.66¼	2.65
Des Moines, Iowa	.....	2.05
Detroit, Mich.	.....	2.00
Duluth, Minn.	.....	2.04
Houston, Texas	.....	2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.	.....	2.30
Jacksonville, Fla.	.....	2.20
Jersey City, N. J.	.....	2.03@2.13
Kansas City, Mo.	.....	1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	.....	2.30
Milwaukee, Wis.	.....	2.00@2.20
Minneapolis, Minn.	.....	2.12@2.22
Montreal, Que.	.....	1.36
New Orleans, La.	.....	2.07
New York, N. Y.	.....	1.93@2.03
Norfolk, Va.	.....	2.07
Oklahoma City, Okla.	.....	2.46
Omaha, Neb.	.....	2.36
Peoria, Ill.	.....	2.22
Philadelphia, Penn.	.....	2.11@2.21
Phoenix, Ariz.	.....	3.26
Pittsburgh, Penn.	.....	2.04
Portland, Colo.	.....	2.80
Portland, Ore.	.....	2.60‡@2.70
Reno, Nev.	.....	2.91
Richmond, Va.	.....	2.24@2.34
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.21
Savannah, Ga.	.....	2.50
St. Louis, Mo.	.51¼	2.05
St. Paul, Minn.	.....	2.12@2.22
Seattle, Wash.	.....	2.50†@2.65
Tampa, Fla.	.....	2.25
Toledo, Ohio	.....	2.20
Topeka, Kan.	.....	2.41
Tulsa, Okla.	.....	2.33
Wheeling, W. Va.	.....	2.12
Winston-Salem, N. C.	.....	2.59

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Buffington, Ind.	.....	1.80
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.45*
Detroit, Mich.	.....	2.15
Hannibal, Mo.	.....	1.90
Hudson, N. Y.	.....	1.75
Leeds, Ala.	.....	1.65
Lime and Oswego, Ore.	.....	2.70‡
Mildred, Kan.	.....	2.35
Nazareth, Penn.	.....	2.15
Northampton, Penn.	.....	1.75
Richard City, Tenn.	.....	2.05
Steelton, Minn.	.....	1.85
Toledo, Ohio	.....	2.20
Universal, Penn.	.....	1.30

NOTE—Add 40c per bbl. for bags.

*Includes sacks.
†10c discount, 10 days. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	12.50	.....	8.25	.....	.....	14.00	15.00	33.61
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio	3.00	4.00	6.00	7.00	9.00	9.00	18.00	7.00	27.50	19.00	.....	.....	.....
Los Angeles, Calif.	.....	.....	7.50@9.50	11.50y	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	10.00	10.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	21.50	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	17.00c@19.00a	.....	.....
Detroit, Mich. (d)	.16	.....	.18
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00@16.00a	.....	.....
Graettinger, Iowa	.18@ .20	.....	.....
Indianapolis, Ind	.13@ .15†	.....	.....
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	20.00	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.20@ .25	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq. 25.00

Indianapolis, Ind.—9x15-in.

	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

	Per 100
Cement City, Mich.:	
5x8x12	5.00
Grand Rapids, Mich.:	
5x8x12	8.00
5x4x12	4.50
Longview, Wash.: (Stone-Tile)	Per 1000
4x6x12	55.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	.....	14.00@23.00
Oak Park, Ill.	.....	42.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	17.00	25.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	.....	.40	.50	.60	.70	.....	.....	.....	.....	.....	.....	.....
Grand Rapids, Mich. (b)																	
Culvert pipe	.....	.....	.....	.60	.72	1.00	1.28	1.60†	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Sewer pipe (d)	.....	.....	.....	.....	.63	.....	.....	.60†	.....	.....	.....	.58	.....	.....	.....	.....	.....
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list; culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.								6 in. to 24 in., $18.00 per ton									
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.70	.....	2.00	.....	2.75	3.40	.....	6.50	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.							1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(a) 24-in. lengths; (b) Reinforced; (d) Eastern clay, list, 72% and 60% off.
†21-in. diam. ‡Price per 2-ft. length.

C. L. Clark Becomes Secretary of Ohio Crushed Stone Association

WORD has recently come to ROCK PRODUCTS that our good friend Claude L. Clark is now established as secretary of the Ohio Crushed Stone Association in the offices of the association at Columbus. We are glad to learn of Mr. Clark in this new work, and look forward to hearing of big things coming from his office.

Plan Two New Superphosphate Plants in Russia

IN order to satisfy the growing demand for mineral fertilizers in Russia it has been decided to build two new factories for the production of superphosphate, one near Moscow and another in the Ukraine. The Moscow plant will have the capacity to produce annually 80,000 tons of superphosphate, while the capacity of the Ukraine plant is to be 100,000 tons of standard superphosphate. In order to supply the raw materials for the Moscow plant it is intended to open a new phosphorite mine near Voskresenskaya, 60 miles from Moscow—*American Fertilizer.*

Experiment with Concrete Railroad Ties in Australia

THE Melbourne Tramways Board, Melbourne, Australia, recently uncovered a number of concrete sleepers which were laid down in 1914 as an experiment. They have been in the ground continuously for 13 years, and are now found to be as sound in condition as when they were first laid. The wooden sleepers in a neighboring length of track have had to be renewed on account of deterioration. The technical staff of the tramways board is considering the matter with a view to further use of concrete sleepers. *Quarry and Surveyors and Contractors Journal* (England).

(Details of an American experiment with concrete sleepers were published in the Cement Products section of ROCK PRODUCTS, December 24, 1927.)

Cement Products

Brandon Rock Products Co. Make Art Marble Furniture

RECENTLY the Brandon Rock Products Co. of Brandon, Vt., producers of terrazzo chips and special granite aggregates, extended their field of activities to include the production of art stone, and this side line now promises to be a very profitable adjunct to the company. E. C. Rockwell, treasurer of the Brandon company, says that the concern has already attained considerable local success with its new line of art marble furniture, and is planning to extend its field in a short time. Already the furniture is being shipped to New Hampshire and New York, and it is also being used on many country estates and summer homes in Vermont. The accompanying views show some of the products turned out at the Brandon company's operation.

Garden seats of art stone, a novelty produced by the Brandon Rock Products Co., Brandon, Vt.

In making the art marble furniture, the fine sizes of the crushed granite are used. This provides an outlet for the fines which otherwise could not be used nearly as profitable. The material is mixed with either regular portland cement or with white portland cement, and is then molded in metal forms. The finishing work is done by hand. Besides the furniture illustrated, the company is contemplating the production of building trim stone and similar pieces.

Colors for Portland Cement Concrete

THE increasing importance of concrete for decorative purposes has accelerated investigations of commercial coloring materials for concrete. The products manufacturer should be able to produce colored units of brilliance, permanence and without decreasing their strength to any great degree —if he knows exactly what to expect from any one or combination of coloring materials. And his future success demands that he know these things.

Within the past year ROCK PRODUCTS has published two articles dealing in a general way with the selection, properties and testing of colors. These were "Coloring Materials for Cement Products," June 25, 1927, and "Properties and Testing of Cement Colors," September 3, 1927, and both were reports of German investigators. The most recent data available on the subject is a preliminary report of tests carried out in the laboratory of the Portland Cement Association at Chicago which was presented at the 1927 convention of the American Concrete Institute. Reprints of this have been authorized as a part of the proceedings of the Institute and are available on request. The tests were carried out under the direction of Raymond Wilson, associate

A side line of art stone furniture produced by the Brandon Rock Products Co. is becoming popular for use on country estates

John Herzog

JOHN HERZOG, 69, senior member of John Herzog and Son, died at his home in Forest, Ohio, on December 16, 1927.

Mr. Herzog was one of the pioneer lime manufacturers of Ohio having spent his entire life from boyhood in the industry. In

John Herzog

his early years he was engaged in the cut stone industry, following the stone-cutters trade which he learned as a boy. In 1898, he located at Tiffin, Ohio, and started a company for the production of lime and crushed stone for road construction and fluxing purposes. The present company is an outgrowth of the early organization and has been for many years regarded as one of the leading lime manufacturing companies of Ohio and remains as a fitting tribute to its organizer, John Herzog.

Mr. Herzog is survived by his widow and one son, Bert, who became associated with his father in the business about 20 years ago and will continue the management of the business along lines identical with its past conduction.

Priddy Co. to Enlarge Land Plaster Plant

CHARLES W. PRIDDY AND CO., INC., the oldest manufacturer of land plaster in Norfolk, Va., has recently contracted for an enlargement of its factory at Money Point, Norfolk county.

The building for the enlargement is already complete and the cement foundations for the new machinery will be laid within a short time. It is estimated that the foundations and new machinery will cost between $40,000 and $50,000. The change will include the most modern machinery used for the grinding of gypsum rock, from which land plaster is made. It will take from 50 to 75 men to operate the plant, which will be capable of an output of 500 tons a day.

Land plaster is used on the peanut crop grown in Virginia and North Carolina. The demand for it only comes during the season from June 15 to about August 1, so that the entire volume must be shipped during June and July. The new plant will be ready to operate early in 1928, but will not start until about May 1. Mr. Priddy declares that the new plant will be able to supply most of the demand of Virginia and North Carolina.—*Norfolk* (Va.) *Pilot.*

Stewart Sand Co. Brings Out New Ready-Mixed Mortar

THE Stewart Sand Co. of Kansas City, Mo., recently announced in their publication, *Better Building,* a new product in the Blue Diamond line. The new product is a ready mixed cement mortar which may be retempered, requires no "cutting in" of additional cement on the job and is very rich and plastic. The cementing ingredients of this mortar are Carney and Fort Scott bricklayers cements, both of which are well known among builders. While these materials have been in use for a number of years, it has not heretofore been possible to produce an entirely satisfactory and finished mortar from them as a ready mixed product, according to the statement issued in the Stewart company's house organ. The new mortar has already been used on several large structures in Kansas City.

Florida Flint Rock Association Formed

AT a meeting of Florida flint rock manufacturers held in Ocala, Fla., on November 5, the Florida Flint Rock Association was formed and the following officers elected, namely: A. T. Thomas, president; A. A. Griffin, vice-president, and W. V. Newsom, secretary and treasurer. The object of the association is to promote the use of flint rock for road building and concrete purposes. Meetings of the association will be held from time to time to discuss ways and means of popularizing the product and it is expected a vigorous campaign will be mapped out to bring the merits of flint rock to the attention of road builders and others who use concrete.

Florida Rock Products Co. in Bankruptcy

THE Florida Rock Products Co. of Brooksville, Hernando county, Fla., is now in bankruptcy, and the property of the company will be disposed of in a short time. This company operated a limestone quarry and crushing plant near Brooksville, a description of which was in the June 26, 1926, issue of ROCK PRODUCTS. L. L. Buchanan, of the firm of Buchanan & Crowder, realtors of Tampa, Fla., is now trustee for the company.

Independent Gravel Co. Leases Missouri Quarry

THE Independent Gravel Co. of Joplin, Mo., has leased the quarries of the Marblehead Lime Co., at White Bear, Mo., located on the C., B. & Q. R. R. between Hannibal and Withers Mill, and will engage in the manufacture of whiting and crushed limestone.

The gravel company expects to spend a very large sum in thoroughly equipping the plant for the manufacture of whiting and other products. The installation of rock crushers and other equipment has already been started, and it is hoped that the plant will be in production early in the spring.—*Hannibal* (Mo.) *Post.*

North American Cement Co. Plans Improvements

CONTRACTS were recently awarded for improvements to the plant of the North American Portland Cement Co. of Albany, N. Y., at Security, Md., near Hagerstown. The North American company recently acquired the Security Lime and Cement Co., and at present the mill is being operated in the name of that company. The expansion program calls for the expenditure of more than $600,000, including building construction and machinery.

Waste heat equipment is being supplied by the Edge Moor Iron Co., Edge Moor, Del., the Foster-Wheeler Corp., New York City, and the Greene Fuel Economizer Co., Beacon, N. Y. The building construction and concrete work is being handled by J. B. Ferguson Co., Hagerstown. Electrical equipment is being supplied by the General Electric Co., Schenectady, N. Y., and condensing equipment by the Worthington Pump and Machinery Corp., Harrison, N. J., and New York City. All piping will be supplied by the W. K. Mitchell Co. of Philadelphia, Penn.

Northern Pacific to Build Gravel Washing Plant in Montana

ANNOUNCEMENT was made recently that the Northern Pacific Railroad will commence work early in the spring on a new gravel pit and gravel washing plant at Horton, Mont., 10 miles west of Miles City, Mont. The new plant will have an annual capacity of 60,000 cu. yd. and will cost about $120,000. The railroad company will spend $50,000 in trackage, and the washing plant will cost $70,000. The Pioneer Sand and Gravel Co. will operate the plant.

The Horton plant will make the sixth of such plants serving the Northern Pacific in carrying out its washed gravel ballast campaign. The company for four years has been treating sections of its roadbed with washed gravel.—*Anaconda* (Mont.) *Standard.*

Announcing a Series of Articles on Lime Manufacture

WE are accustomed to consider the United States as the leading industrial nation of the world. We are in the habit of believing that our European contemporaries have much more to learn about *our* way of doing things than we have to learn about theirs. The last few years have tended to increase our faith in these beliefs because we have had visitors from nearly every nation abroad to observe and study our industries—and the rock products industry has been no exception.

But for a long time we have had some misgivings as to our supremacy in the lime industry. Germany, for example, with a much smaller territory and population, has an annual consumption of lime almost as much as the United States. Moreover, we had every reason to believe lime is manufactured much more economically and efficiently in Europe than in this country.

There was only one way to verify our beliefs and to serve the American lime industry as a faithful journal dealing with that industry should serve it. We must make a thorough-going study and investigation of the lime industry in Europe.

Fortunately we were able to interest the one man in the United States best able and prepared to make such a study—Victor J. Azbe, of St. Louis, Mo. Mr. Azbe is already known to every progressive lime manufacturer because of his contributions to our knowledge of lime and lime manufacture. He is an outstanding engineer who has specialized many years on problems of fuel burning and the efficiency of fuel-burning equipment. Realizing that efficient fuel burning—the most lime for the heat energy consumed—was the key problem of the lime industry, a few years ago, Mr. Azbe turned much of his interest and attention to the lime industry. Since then he has made important and outstanding contributions to the lime industry, both as a whole, and in solving the problems of individual manufacturers.

So last July Mr. Azbe left New York for Europe, armed with a speaking and reading knowledge of German and other European languages, with letters of introduction to the principal lime manufacturers of Germany and other countries, and with letters to the European representatives of many of ROCK PRODUCTS' advertisers. For more than two months he studied the lime industry of Germany and other countries most intensively, and was able to draw some very interesting and valuable conclusions: We *are* behind Europe in lime manufacturing technique; just where and how and why Mr. Azbe will explain to ROCK PRODUCTS readers in a series of articles beginning with the January 21 issue, which we are certain will furnish much valuable information to the entire lime industry.

Victor J. Azbe's career is interesting and inspiring. He was born in Laibach, in what is now the kingdom of Jugo-Slavia. At 17 years of age he emigrated to the United States. He started in at once to earn his living and acquire a technical education under the most discouraging auspices. To-

Victor J. Azbe

day he is a member of many engineering and scientific societies and a nationally recognized authority in the field of combustion engineering.

Mr. Azbe maintains one of the finest private research laboratories in America, and there he has carried out, and is continuing investigations as to the nature of limestone and lime, which place him in a class almost by himself in the lime industry. Much research has been done on uses of lime, but very little on its manufacture, and the nature of the physical and chemical problems involved in the operation of a lime kiln.

Reliance Rock Products Co. Building Plant Near Los Angeles

WORK is nearing completion on the $50,000 plant of the Reliance Rock Products Co. at Sawtelle, Calif., near Los Angeles. It is expected that the new plant will begin operating during January. The pit is already completed and the switch track into the plant is under construction. Work on the construction of the bunkers is well under way. There will be ten bins specially equipped for ease in unloading and loading cars or trucks. Six hundred feet of trackage on the Pacific Electric freight line will make it possible to handle 15 cars of rock or sand at one time.

The plant will be used for distribution of rock and sand throughout the Sawtelle area, including Westwood, the new university site, and many sections of the bay district. Recent growth of this territory and the erection of thousands of new homes is said to have created a big demand for rock products.—*Los Angeles* (Calif.) *Times.*

Certainteed Products Co. Sells Gravel Interests in Michigan

IN a deal involving expenditure of $100,000, the Grand Rapids Gravel Co., Grand Rapids, Mich., purchased from the Certainteed Products Co., New York, its gravel business in the Grand Rapids district. The transfer includes purchase of a gravel pit of nearly 300 acres in Wyoming township, Mich.

The Grand Rapids Gravel Co. plans to put up a modern gravel plant immediately. The plant, to cost about $50,000, will handle "batch deliveries." It will have facilities for washing and preparing sand and gravel by the latest methods. The property, which has trackage on the Pere Marquette railway for car delivery, is considered one of the last remaining large deposits of gravel in the immediate vicinity of Grand Rapids.—*Grand Rapids* (Mich.) *News.*

Henry S. Spackman

LIEUT.-COL. HENRY S. SPACKMAN, 61, former president of the engineering company which bore his name, and now the E. L. Conwell Co., Philadelphia, died on December 21. Col. Spackman began his professional career with James W. Queen Co., Philadelphia. He was then successively employed by the Pennslyvania Railroad, on building construction for the state of Pennslyvania, by the Philadelphia Department of Public Works and by James H. Windrim as constructing engineer. In 1896 he helped organize and was a member of the firm of Lathbury & Spackman, which later became the Henry S. Spackman Engineering Co., engineers and consultants in physical and chemical analyses of structural materials.

Col. Spackman is best remembered in the rock products industry for his contributions to the manufacture of alumina cements, his patents being generally regarded as among the first to be granted in the United States for its manufacture. In fact, some of his inventions have been in successful use at one of the large cement manufacturing companies since their innovation.

During the World War, Col. Spackman served as chief of the cement section and as technical adviser to the Peace Commission.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	.....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	.....
Dundas, Ont.	.30	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@1.00	1.35@1.50	1.15@1.50	1.10@1.15	1.05@1.10	1.05@1.10
Ft. Spring, W. Va.	.50	1.45	1.35	1.25	1.20	.....
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@ .60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	.....
Rochester, N. Y.	1.50	1.50	1.50	1.50	1.50	1.50
Wafford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.50	.50	.50	.50	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Chasco, Ill.	1.00@1.30	.....	1.00@1.15	.....	1.00@1.15	.....
Columbia and Krause, Ill.	.90@1.20	.90@1.20	1.00@1.20	1.00@1.20	1.00@1.20	1.25
Dubuque, Iowa (e)	.75	1.20@1.30	.....	1.20@1.30	1.20@1.25	.....
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa (f)	1.10	1.55	1.55	1.55	.....	.....
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	.....
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.30	1.20	1.00	.....
St. Vincent de Paul, Que.	.75	1.35	1.20	1.00	1.00	1.15
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Valmeyer, Ill. (fluxing limestone)	.90@1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.90	.90	.90	.90	.90	.....
Wisconsin Points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	.....	2.65	2.65	2.40	2.00
Cartersville, Ga.	1.50	1.65	1.65	1.35	1.15	.....
Chico and Bridgeport, Tex.	1.00	1.30	1.25	1.20	1.05	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Graystone, Ala.			Crusher run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, $1 per ton			
Ladds, Ga.	.....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.25	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.15	1.15	1.15	1.15	1.15	1.15

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.00	1.75	1.55	1.25	1.25
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	.....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.40	1.80	1.60	1.40	1.40	.....
Oakland and El Cerito, Calif.	1.00	1.00	1.00	.90	.90	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
San Diego, Calif.	.50@ .75	1.25@1.50	1.25@1.50	1.10@1.25	1.10@1.25	.....
Springfield, N. J.	1.60	2.20	2.10	1.70	1.60	.....
Toronto, Ont.	.....	3.58@4.05	3.05@3.80	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Columbia, S. C.	.....	.....	2.00	1.80	1.65	.....
Eastern New York—Syenite	.75	1.25	1.25	1.25	1.25	1.25
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.			Crushed flint rock, 2.50 per cu. yd.			
Graystone, Ala.—Granite	.50	.....	.....	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Rochester, N. Y.			Dolomite, all sizes, 1.50 per ton			
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	.....	.....	1.40	1.25	1.25	1.25

(a) Sand. (b) to ⅜ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh 4.50
Atlas, Ky.—90% thru 100 mesh 2.00
50% thru 100 mesh 1.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh 1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh 1.50
Cartersville, Ga.—90% thru 4 mesh 1.50
Charleston, W. Va.—Marl, per ton, bulk 3.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk 2.50

Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh 2.25

Cypress, Ill.—90% thru 100 mesh 1.35
Ft. Spring, W. Va.—50% thru 50 mesh 1.00

Hartford, Conn.—Paper bags, 4.25; cloth bags, 4.75; bulk 3.25

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95
Bulk 2.70

Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk 2.75

Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh 3.50

Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk 2.70

Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh 1.50@ 2.75

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk 3.50

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk, 1.75; bags 3.75
Marl—Analysis, 90% $CaCO_3$; 10% $MgCO_3$; bulk, 2:25; bags 4.00

Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton 2.00

Middlebury, Vt.—Analysis, 90.05% $CaCO_3$; 90% thru 50 mesh 6.00

Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk 1.35@ 1.60

Olive Hill, Ky.—90% thru 4 mesh 1.00

Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100 2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk 3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk 2.00

Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk 2.75
Toledo, Ohio—30% thru 50 mesh 2.25

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk 3.25
Carload, 7.50; less than carload 9.00

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh 3.00
Atlas, Ky.—90% thru 4 mesh 1.00

Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5%; $MgCO_3$; 90% thru 10 mesh 1.50
Brandon, Vt.—Bulk 4.00

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh	3.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@ 1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk	3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va.—Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags	5.00
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	1.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh; paper bags	3.50
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Buffalo, N. Y.	2.00@ 2.50
Cedarville and S. Vineland, N. J.	2.25
Estill Springs and Sewanee, Tenn.	1.50
Gray Summit and Klondike, Mo.	1.75@ 2.00
Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Massillon, Ohio	3.00
Mendota, Va.	2.25@ 2.50
Michigan City, Ind.	.35
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Pittsburgh, Penn.	3.00@ 4.00
Red Wing, Minn.	1.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.00
San Francisco, Calif.	4.00@ 5.00
Silica, Va.	2.00@ 2.50
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Chippewa Falls, Wis.		.25*
Columbus, Ohio		.15@ .30
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@ 1.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Asbury Park, Spring Lake and Wayside, N. J.	.80	.70	1.25	1.50		
Attica and Franklinville, N. Y.	.95	.95	.95	.95	.95	.95
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.		1.00*		1.50*	1.75*	
Leeds Junction, Me.		.50	1.75		1.25	1.00e
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.90	.85	.75	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.25@ .80	.50@ .70	.10@ .40	.50@ .70	.60@ .80	.60@ .80
Barton, Wis.		.55	.75	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio		.75	.75	.75	.75	
Des Moines, Iowa		.30	1.30	1.30	1.30	1.30
Eau Claire, Chippewa Falls, Wis.	1.00	.50	.65	1.05	.95	
Elkhart Lake, Wis.	.60	.40	.60	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00	1.00	1.00	
Hersey, Mich.		.50		.70		.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60	.75	.75	.75	.75
Joliet, Plainfield & Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.				1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .50	.40@ .50	1.40	1.35	1.25	
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.85	.80	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.25	1.15
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Brewster, Fla.	.45	.45	2.75	2.50		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Chattahoochie River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.50	.50				
New Martinsville, W. Va.	1.00	.90@1.00		1.30@1.40		.80@ .90
Roseland, La.	.25	.15	1.25	.85	.65	
WESTERN:						
Kansas City, Mo.		.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Phoenix, Ariz.		1.00*	2.00*	2.00*	1.10*	1.00*
Pueblo, Colo.	.70	.60		1.20		1.15
San Diego, Calif.		.40@ .50	.80@1.00	.80@1.00	.65@ .80	.65@ .80
Seattle, Wash.	1.25	1.25	1.25	1.25	1.45	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.	.75					
Des Moines, Iowa	.50					
Dresden, Ohio	.50	.60	.70	.65	.65	.60
East Hartford, Conn.	.85*d					
Eau Claire, Chippewa Fls., Wis					.65	
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas		1.10			.55	
Macon, Ga.	1.25‡					
Mankato, Minn.	.30					
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.					.50	
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Winona, Minn.	.60	.60	60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ¾-in. down. (b) River run. (c) 2½-in. and less ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramec River.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.00	2.00	2.00@2.25	1.50		4.00	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75	1.75		1.75	1.75@2.00		
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Cedarville and S. Vineland, N. J.				2.25			
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	
Dresden, Ohio	1.50@1.75	1.35@1.50	1.50@1.75	1.25	1.35		
Eau Claire & Chippewa Falls, Wis. (e)						3.00	3.00
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Klondike, Mo.				2.00	2.00		2.00
Massillon, Ohio	2.25	2.25		2.25	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30@ .35			
Millville, N. J.				1.75b		3.50	
Montoursville, Penn.				1.35@1.60			
New Lexington, O.	1.75	1.25					
Ohlton, Ohio	1.75b	1.75b		2.00b	1.75b	1.75b	
Ottawa, Ill.						3.50	
Red Wing, Minn. (d)					1.50	3.00	1.50
Round Top, Md.				1.60		2.25	
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Va.	Ground glass sand, 140-mesh, per ton, 8.00@10.00						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.00	1.75*@2.00	1.75	1.75*@2.00	1.75		
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.00			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio	2.05*	1.05*	1.55*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.00	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95[4]
Chazy, N. Y.		8.50	7.50	10.00		15.50[1]	8.50	14.00
Lime Ridge, Penn.					5.00[2]			
Pittsburgh, Penn.	12.50	8.50	8.50		9.00	11.00		
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65[7]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		9.00		8.00	1.50
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	11.50	8.50	8.50		9.00	11.00		
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio[6]	11.50							
Milltown, Ind.		8.50@10.00		10.00[3]			8.50[22]	1.35[16]
Scioto & Marble Cliff, O.		8.50	8.50	8.50	8.25	.62½	7.50	1.50[3]
Sheboygan, Wis.		11.50			9.50			2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	8.50	8.50	12.50	9.00	11.00[6]	9.00	1.50[3]
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Frederick, Md.		9.00	9.00	9.50	7.50	9.00	7.50	9.00
Graystone, Ala.	12.50	10.00		12.50		1.40[24]	8.50	1.50
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	20.25	9.00@10.00	9.00	9.00			8.50	1.50
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.		11.50	10.00				12.00	1.30
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50[3]	1.50[23]
San Francisco, Calif.	20.00	20.00	13.50	21.00			14.50[20]	2.15
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[11]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65. [8] To 11.00 [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00 [12] To 3.00. [13] Delivered in Sothern California. [14] Per 2 bags of 90 lb. each. [22] To 9.00. [23] To 1.60. [24] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.10
Ohlton, Ohio	*1.75@ 2.00	*1.75
Red Wing, Minn.		1.00
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel crayons, gross	1.00@ 2.80
Chatsworth, Ga.:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh)	10.00
Pencils and steel crayons, per gross	1.50
Chester, Vt.:	
Ground talc (150-200 mesh), paper bags	9.00@10.00
Same, burlap bags, bags extra	8.00@ 9.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc (for grinding)	5.00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Glendon, N. C.:	
Ground talc (150-200 mesh), bulk	6.00@10.00
Ground talc (150-200 mesh), bags	8.00@14.00
Pencils and steel crayons, gross	1.05@ 2.00
Blanks, .08 per lb.; cubes	50.00
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bags	9.50@14.50
Joliet, Ill.:	
Crude talc	5.00
Southern talc	17.00
Illinois talc	10.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock	
Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-68%	3.75@ 4.25
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00
Ground Rock (2000 lb.)	
Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72.5%	9.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12
Cut mica—50% from Standard List.	

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.— All colors and sizes	§3.00	§3.00
Buckingham, Que.—Buff stucco dash	.....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries	.....	17.50
Crown Point, N. Y.— Mica spar	.....	9.00@10.00
Dayton, Ohio	.....	6.00@24.00
Easton, Penn.— Green stucco	.....	12.00@18.00
Green granite	.....	14.00@20.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingemar, Ohio—Concrete facings and stucco dash	.....	10.00@20.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	5.50@ 7.50
Milwaukee, Wis.	.....	14.00@34.00
New York, N. Y.—Red and yellow Verona	.....	32.00
Phillipsburg, N. J.— Royal green granite	.....	15.00@17.00
Randville, Mich.— Crystalite crushed white marble, bulk	4.50@ 6.00	4.50@ 7.50
Rose pink granite, bulk	.....	12.00
Stockton, Calif.—"Natrock" roofing grits	.....	12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	.....
Wauwatosa, Wis.	.....	20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 17.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Bristol, Tenn.—Color, white; analysis, K_2O, 6 to 10%; Na_2O, 2½ to 4%; SiO_2, 68 to 78%; Fe_2O_3, 12 to 20%; Al_2O_3, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade	14.50@18.00
Brunswick, Me.—Color, white; 99% thru 140 mesh, bulk	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; crude, bags, 12.25; bulk	11.05
Pulverized, 95% thru 200 mesh; bags, 19.73@22.00; bulk	18.73@20.70
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk	18.00
Crude	9.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
Crude, bulk	9.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Brandon, Vt.	10.00
Cartersville, Ga.—(Limestone), per bag	2.25
Centerville, Iowa—(Gypsum), per ton	18.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.—(Limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton	15.00
Gypsum, Ohio—(Gypsum), per ton	10.00
Hartford, Conn.	‡7.50@*9.00
Limestone, Wash. — (Limestone), per ton	12.50
Los Angeles, Calif.	18.55
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	10.00
Warren, N. H.—(Mica), per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone), bulk	‡7.50@*9.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	9.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	16.00
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	12.75@16.50‡
New Brighton, Minn.	10.00
Pontiac, Mich.	19.75
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	16.00*†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	14.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M., 10 days. ‡L.C.L.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¼	3.47
Atlanta, Ga.	.....	2.35
Baltimore, Md.	.....	2.15@2.25
Birmingham, Ala.	.....	2.10
Boston, Mass.	.....	2.13@2.23
Buffalo, N. Y.	.....	2.20@2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.24
Charleston, S. C.	.....	2.35
Cheyenne, Wyo.	.82¼	3.31
Cincinnati, Ohio	.....	2.23
Cleveland, Ohio	.....	2.24
Chicago, Ill.	.51¼	2.05
Columbus, Ohio	.57¼	2.29
Concrete, Wash.	.....	2.35
Dallas, Texas	.....	2.00
Davenport, Calif.	.....	2.45*
Davenport, Iowa	.....	2.24
Dayton, Ohio	.58¼	2.33
Denver, Colo.	.66¼	2.65
Des Moines, Iowa	.....	2.05
Detroit, Mich.	.....	2.00
Duluth, Minn.	.....	2.04
Houston, Texas	.....	2.00
Indianapolis, Ind.	.54¼	2.19
Jackson, Miss.	.....	2.30
Jacksonville, Fla.	.....	2.20
Jersey City, N. J.	.....	2.03@2.13
Kansas City, Mo.	.....	1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	.....	2.30
Milwaukee, Wis.	.....	2.00@2.20
Minneapolis, Minn.	.....	2.12@2.22
Montreal, Que.	.....	1.36
New Orleans, La.	.....	2.07
New York, N. Y.	.....	1.93@2.03
Norfolk, Va.	.....	2.07
Oklahoma City, Okla.	.....	2.46
Omaha, Neb.	.....	2.36
Peoria, Ill.	.....	2.22
Philadelphia, Penn.	.....	2.11@2.21
Phoenix, Ariz.	.....	3.26
Pittsburgh, Penn.	.....	2.04
Portland, Colo.	.....	2.80
Portland, Ore.	.....	2.60‡@2.70
Reno, Nev.	.....	2.91
Richmond, Va.	.....	2.24@2.34
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.21
Savannah, Ga.	.....	2.50
St. Louis, Mo.	.51¼	2.05
St. Paul, Minn.	.....	2.12@2.22
Seattle, Wash.	.....	2.50†@2.65
Tampa, Fla.	.....	2.25
Toledo, Ohio	.....	2.20
Topeka, Kan.	.....	2.41
Tulsa, Okla.	.....	2.33
Wheeling, W. Va.	.....	2.12
Winston-Salem, N. C.	.....	2.59

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¼	1.75
Buffington, Ind.	.....	1.80
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.45*
Detroit, Mich.	.....	2.15
Hannibal, Mo.	.....	1.90
Hudson, N. Y.	.....	1.75
Leeds, Ala.	.....	1.65
Lime and Oswego, Ore.	.....	2.70‡
Mildred, Kan.	.....	2.35
Nazareth, Penn.	.....	2.15
Northampton, Penn.	.....	1.75
Richard City, Tenn.	.....	2.05
Steelton, Minn.	.....	1.85
Toledo, Ohio	.....	2.20
Universal, Penn.	.....	1.80

NOTE—Add 40c per bbl. for bags.

*Includes sacks.
†10c discount, 10 days. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	12.50	.....	8.25	.....	.....	14.00	15.00	33.61
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio	3.00	4.00	6.00	7.00	9.00	9.00	18.00	7.00	27.50	19.00	.....	.....	.....
Los Angeles, Calif.	.....	.....	7.50@9.50	11.50y	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	10.00	10.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	21.50	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	17.00c@19.00a	.....	.....
Detroit, Mich. (d)	.16	.....	.18
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00@16.00a	.....	.....
Graettinger, Iowa	.18@ .20	.....	.....
Indianapolis, Ind	.13@ .15†	.....	.....
Los Angeles, Calif.¶	5¼x3½x12—55.00	7¼x3½x12—65.00	
Oak Park, Ill.	20.00	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.20@ .25	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq. 25.00

Indianapolis, Ind.—9x15-in. Per sq.

Gray	10.00
Red	11.00
Green	13.00

Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Grand Rapids, Mich.:	
5x8x12	8.00
5x4x12	4.50
Longview, Wash.:	Per 1000
(Stone-Tile)	
4x6x12	55.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif.	
(Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	.....	14.00@23.00
Oak Park, Ill.	.....	42.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	17.00	25.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	.....	.40	.50	.60	.70	.....	.....	.....	.....	.....	.....	.....
Grand Rapids, Mich. (b)																	
Culvert pipe	.....	.....	.....	.60	.72	1.00	1.28	1.60†	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Sewer pipe (d)	.....	.....	.....	.....	.....	.63	.....	.60†	.....	.....	.....	.58	.....	.....	.....	.....	.....
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list; culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.								6 in. to 24 in., $18.00 per ton									
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.70	.....	2.00	.....	2.75	3.40	.....	6.50	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.							1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(a) 24-in. lengths; (b) Reinforced; (d) Eastern clay, list, 72% and 60% off.
†21-in. diam. ‡Price per 2-ft. length.

C. L. Clark Becomes Secretary of Ohio Crushed Stone Association

WORD has recently come to ROCK PRODUCTS that our good friend Claude L. Clark is now established as secretary of the Ohio Crushed Stone Association in the offices of the association at Columbus. We are glad to learn of Mr. Clark in this new work, and look forward to hearing of big things coming from his office.

Plan Two New Superphosphate Plants in Russia

IN order to satisfy the growing demand for mineral fertilizers in Russia it has been decided to build two new factories for the production of superphosphate, one near Moscow and another in the Ukraine. The Moscow plant will have the capacity to produce annually 80,000 tons of superphosphate, while the capacity of the Ukraine plant is to be 100,000 tons of standard superphosphate. In order to supply the raw materials for the Moscow plant it is intended to open a new phosphorite mine near Voskresenskaya, 60 miles from Moscow—*American Fertilizer.*

Experiment with Concrete Railroad Ties in Australia

THE Melbourne Tramways Board, Melbourne, Australia, recently uncovered a number of concrete sleepers which were laid down in 1914 as an experiment. They have been in the ground continuously for 13 years, and are now found to be as sound in condition as when they were first laid. The wooden sleepers in a neighboring length of track have had to be renewed on account of deterioration. The technical staff of the tramways board is considering the matter with a view to further use of concrete sleepers. *Quarry and Surveyors and Contractors Journal* (England).

(Details of an American experiment with concrete sleepers were published in the Cement Products section of ROCK PRODUCTS, December 24, 1927.)

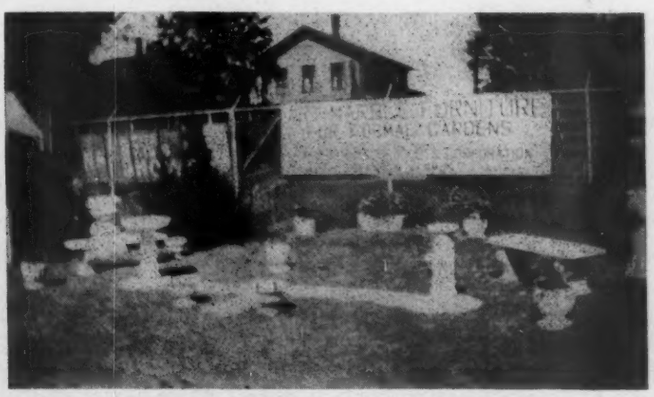
Cement Products

Brandon Rock Products Co. Make Art Marble Furniture

RECENTLY the Brandon Rock Products Co. of Brandon, Vt., producers of terrazzo chips and special granite aggregates, extended their field of activities to include the production of art stone, and this side line now promises to be a very profitable adjunct to the company. E. C. Rockwell, treasurer of the Brandon company, says that the concern has already attained considerable local success with its new line of art marble furniture, and is planning to extend its field in a short time. Already the furniture is being shipped to New Hampshire and New York, and it is also being used on many country estates and summer homes in Vermont. The accompanying views show some of the products turned out at the Brandon company's operation.

Garden seats of art stone, a novelty produced by the Brandon Rock Products Co., Brandon, Vt.

In making the art marble furniture, the fine sizes of the crushed granite are used. This provides an outlet for the fines which otherwise could not be used nearly as profitable. The material is mixed with either regular portland cement or with white portland cement, and is then molded in metal forms. The finishing work is done by hand. Besides the furniture illustrated, the company is contemplating the production of building trim stone and similar pieces.



A side line of art stone furniture produced by the Brandon Rock Products Co. is becoming popular for use on country estates

Colors for Portland Cement Concrete

THE increasing importance of concrete for decorative purposes has accelerated investigations of commercial coloring materials for concrete. The products manufacturer should be able to produce colored units of brilliance, permanence and without decreasing their strength to any great degree —if he knows exactly what to expect from any one or combination of coloring materials. And his future success demands that he know these things.

Within the past year ROCK PRODUCTS has published two articles dealing in a general way with the selection, properties and testing of colors. These were "Coloring Materials for Cement Products," June 25, 1927, and "Properties and Testing of Cement Colors," September 3, 1927, and both were reports of German investigators. The most recent data available on the subject is a preliminary report of tests carried out in the laboratory of the Portland Cement Association at Chicago which was presented at the 1927 convention of the American Concrete Institute. Reprints of this have been authorized as a part of the proceedings of the Institute and are available on request. The tests were carried out under the direction of Raymond Wilson, associate

chemist of the Portland Cement Association. The summarized report follows:

Exposure tests have been made on about 2400 mortar discs colored with integral admixtures of 264 commercial pigments. Quantitative measurements of the color of the discs were made by the use of the Munsell color system and from the changes in color due to exposure to weather some relations between chemical composition of the pigments and the color permanence of the mortars have been determined. Data on the effect of weather on the color during six months exposure are considered in this paper.

All the pigments were subjected to exposure tests in 1:3 white cement mortars with 5 and 10% admixtures (by weight of cement) of the buffs and yellows, 1 and 2% of the carbon blacks and 3 and 6% of the other pigments. More intensive tests were made on 17 pigments of representative chemical composition; these pigments were used in studies of their effect on strength of mortars at various ages from seven days to five years, and on color, color permanence and 28-day strength, as influenced by hydrated lime admixtures and curing conditions. Six pigments were selected as representative of the predominant chemical composition in the various hues for tests of the effects of mix and consistency of the mortar and quantity of pigments.

In the rather small quantities used in the greater portion of these tests most of the representative pigments which were of satisfactory permanence did not cause great variations in strength. Pigments containing calcium sulphate had the same general effect as admixtures of gypsum. Admixtures of from 1 to 10% of carbon black reduced the strength under all conditions of test though there were variations in the actual reductions obtained in groups of tests made at different times and in which there was some duplication.

Two samples of ultramarine blue gave results which appear not to be in complete accord; the tests were not parallel and were made at different times. This is probably because ultramarine blue is to some extent a chemically active admixture and different samples may be expected to have somewhat different effects.

Admixtures of 10 and 20% of ochre, red iron oxide, black iron oxide and chromium oxide resulted in somewhat increased 28-day strengths under the conditions used in one group of tests. Larger quantities of ochre, red iron oxide and chromium oxide caused reductions while only slight changes in strength were caused by 30 to 50% of black iron oxide.

The most important conclusions which may be drawn at present are:

1. Most of the pigments used in these tests, and which are probably representative of those now on the market, are of a satisfactory degree of permanence, so far as may be judged by six months exposure tests in 1:3 portland cement mortars.

2. The following types of pigments were suitable from the standpoint of permanence after six months exposure:

Buff, Yellow, Red—Iron oxide pigments.

Green—Chromium oxide.

Blue—Ultramarine blue.

Brown—Iron oxide, or iron and manganese oxide pigments.

Black—Iron oxide, manganese dioxide, carbon black, bone ash and the so-called mineral blacks (coal, coke and certain unidentified carbonaceous minerals high in mineral matter).

3. Cadmium, lithopone, zinc, chromate and organic colors are not suitable for general use in portland cement mortar.

4. Among the pigments classed as of satisfactory permanence after six months exposture, no differences in degree of color permanence could be observed.

5. In cases where abrasion may result in exposure of the aggregate by removal of the coating of colored cement paste, care should be taken to use aggregates of a neutral color or of a color which will harmonize with that of the pigment.

6. The ratio of pigment to cement is the most important factor affecting the color of mortar produced by a given pigment.

The effect of a given pigment on the color of a mortar as expressed in terms of the Munsell system is proportional to the logarithm of the quantity of the pigment, the *chroma* being directly and the *value* inversely proportional.

7. The kind of cement and the mix and consistency of the mortar are factors of secondary importance affecting the color. Curing conditions and admixtures of hydrated lime make practically no difference in the color, other conditions being the same.

8. Under some conditions quantities of certain mineral pigments in excess of the 10% generally recommended as a limit may be used without seriously impairing the strength. These tests are not broad enough in scope to serve as the basis of a general recommendation regarding the quantity of various pigments which may be safely added without serious reductions in strength.

9. In mortars containing the quantities of pigments usually used, the effects of water-cement ratio, mix, consistency and curing condition on the compressive strength are about the same as on mortar without pigment.

10. Iron oxide black is preferable to carbon black since equally dark colored mortar can be produced with the iron black with less reduction in the strength of the mortar.

Northwest Concrete Products Men to Meet in Portland

THE third annual convention of the Northwest Concrete Products Association will be held in Portland, Ore. at the Multnomah Hotel January 13, 14 and 15. Clyde Grutze, of the Concrete Pipe Company, is general chairman for the meeting, with Jack Collins of Collins Concrete Pipe Company, and William J. Mackenzie of Tuerck-Mackenzie company, completing the general committee. Addresses by several nationally prominent concrete specialists will feature the convention. In addition, there will be an exhibit of field work, a demonstration of the manufacture of 42-in. machine pipe, adoption of standard specifications on several products and the election of new officers.

The program includes a talk by C. H. Bullen, former Portland resident, now manager of the Midwest Concrete Pipe Co. of Chicago, and a member of the executive committee of the American Concrete Pipe Association. Ira Collier of the engineering department of the University of Washington will speak on steam curing concrete pipe.

Capital Granite Co. Formed at Columbia, S. C.

A NEW stone company, the Capital Granite Co., has recently been organized at Columbia, S. C. Robert G. Lassiter of Oxford, N. C., and W. T. Ragland and D. E. Saunders of Columbia, are the organizers of the company which has been incorporated with a capital stock of $500,000 of preferred stock, and 5,000 shares of common stock with no par value. It is the purpose of the new company to operate large quarries at Blairs, S. C., where the Blair Quarry Co. has heretofore operated. The company will spend several hundred thousand dollars in equipment and hopes to be actually marketing stone in 90 days. The capacity of the quarry will be approximately 60 cars of stone per day.

Mr. Lassiter is largely interested in stone quarrying and crushing in North Carolina and operates quarries at Graystone, Rockton, Neverson, Rolesville and Greensboro, N. C., and two quarries at Miami, Fla.

Mr. Lassiter has been named president of the Capital company; Wm. C. Mallonee, E. N. Ragland and George Goodwin are the vice-presidents; W. T. Ragland is vice-president and treasurer; and D. E. Saunders is secretary and assistant treasurer.

Concrete Pipe Sewers

A NEW bulletin on Concrete Pipe Sewers has recently been published by the American Concrete Pipe Association, Chicago. The booklet is chiefly taken up with notes, fully illustrated, concerning various sewage disposal systems where concrete pipe was used. The bulletin illustrates that concrete pipe is adaptable to the largest or smallest layout desired, and further that the work of laying the sewer can be carried on in winter as well as in summer. Chapters on the manufacture of concrete pipe, the history of sanitary engineering and the history of concrete pipe for use as sewers, are included in the bulletin.

Great Northern Stone Company Installing New Equipment

THE Great Northern Stone Co., which recently acquired the quarry and plant of the Lake Shore Stone Products Co. of Sandusky, Ohio, is installing a large amount of new equipment in preparation for the starting of operations. A big locomotive crane is one of the largest pieces of equipment placed thus far. New crushing machinery is being shipped in and extensive improvements are to be made to the plant.

G. C. Mason of Cleveland is in charge of the work at the plant. No Sandusky office has yet been opened.—*Sandusky* (Ohio) *Star.*

German Company Plans Jutland Cement Mill

A GERMAN syndicate has recently been negotiating for the purchase of further extensive areas of land alongside the fjord at Aalborg, Jutland, in the neighborhood where there are already five Danish cement works.

Names and figures have not been disclosed, but it is reported that the negotiations are approaching completion and that if the plan materializes either a special harbor or a local railway will be built for the purposes of the new works.—*New York Journal of Commerce.*

New Belgian Standards for Cement

F. VAN ORTROY, general secretary, Cimenteries et Briqueteries Réunies, S. A., Antwerp, Belgium, has written ROCK PRODUCTS to the effect that the Belgian specifications have been revised and put into effect July 13, 1927, thus antedating the recently revised German specifications by several months. The new standards distinguish three kinds of cement: ordinary portland cement, early high strength portland cement and quick-hardening portland cement. The complete letter follows:

EDITOR, ROCK PRODUCTS:

On page 93 of the November 26 number of your valuable paper we find the new German standards on cement issued on October 15. Perhaps it will interest you to know that prior to this the Belgian Ministries have also issued new specifications for portland cement and we send you herewith a copy of these, as published by the Ministry of Public Works on July 13.

Three qualities of portland cement are distinguished, viz.: normal portland cement, high-strength portland cement and rapid-hardening portland cement; the required strengths of these three classes are reproduced below, for mortars composed of one part of cement to three parts of standard sand.

The previous standards were the following:

	1 day moist air 6 days under water	1 day moist air 27 days under water
Tensile strength	185	284
Compressive strength	1848	2845

By comparing both, you will see how much the latter, which of course were very obsolete, have been improved, in order to bring them in accordance with the present high standard of the Belgian cement industry.

F. VAN ORTROY.

December 16, 1927.

BELGIAN STANDARD SPECIFICATIONS FOR CEMENT ADOPTED JULY 13, 1927

Portland Cement	Strength lb./in.²	1 day moist air	1 day moist air 2 days under water	1 day moist air 6 days under water	1 day moist air 27 days under water	Residue, 4900-mesh 175-mesh, (English), sieve
Normal	Tensile	.....	.....	256	327	18%
	Compressive	.....	.....	2845	4267	
High Strength	Tensile	.....	327	355	427	14%
	Compressive	.....	4267	427	7111	
Rapid Hardening	Tensile	284	355	5689	455	10%
	Compressive	3200	5689	7111	7822	

Gravel Company in Law Case of National Importance

AT the request of the Department of Justice a case of considerable importance has been advanced by the Supreme Court of the United States and is set for argument on February 20. This is the case of the Boston Sand & Gravel Co. vs. the United States, involving a question of the payment of interest upon a claim of the company against the government.

The case was brought by the sand company to recover from the government interest on damages awarded it for losses suffered through a collision of one of its lighters in Boston harbor in 1918 with the naval destroyer "Bell."

The company contended, as do 282 other claimants with cases now pending, that the government must pay interest from the date of the loss. The lower federal courts held otherwise.—*New York Journal of Commerce.*

Van Sciver Corporation Buys Government Gravel Land

THE Van Sciver Corp., Philadelphia, Penn., dealing in mason's materials, has acquired from the U. S. War Department a bag-loading plant and powder arsenal at Tullytown, Penn., comprising 1150 acres of land. In addition to the buildings on the property, there are valuable deposits of sand and gravel also, and these deposits brought considerable competition in the bidding for the tract. The first bid registered was $350,000, but the price accepted by the ordnance department was the bid of $1,620,000 made by the Van Sciver Corp. The United States bought the land for $450,000 at the outbreak of the war.

Manufacturers to Exhibit at the West Baden Convention

THE following associate members of the National Crushed Stone Association have signified their intention of exhibiting at the coming West Baden, Ind., convention, January 16, 17, 18 and 19:

LIST OF EXHIBITORS, N. C. S. A. CONVENTION, WEST BADEN, IND., JANUARY 16 TO 18, INCL.

Allis-Chalmers Manufacturing Co.
American Manganese Steel Co.
American Tar Products Co.
Armstrong Manufacturing Co.
Atlas Powder Co.
Bakstad Crusher and Equipment Corp.
Blaw-Knox Co.
Bucyrus Co.
Burrell Engineering and Construction Co.
Cement, Mill and Quarry.
Cross Engineering Co.
E. I. duPont de Nemours & Co.
The Dorr Company
Easton Car and Construction Co.
Fate-Root-Heath Co.
Flexible Steel Lacing Co.
General Electric Co.
Good Roads Machinery Co.
Grasselli Powder Co.
Harnischfeger Sales Corp.
Hayward Company
Heisler Locomotive Works
Hendrick Manufacturing Co.
Hercules Powder Co.
Ingersoll-Rand Company.
Jeffrey Manufacturing Co.
Kennedy-Van Saun Manufacturing Co.
Keystone Lubricating Co.
Koppel Industrial Car & Equipment Co.
Loomis Machine Co.
Manganese Steel Forge Co.
Marion Steam Shovel Co.
McGraw Hill Catalog and Directory Co.
National Crushed Stone Association.
National Malleable and Steel Casting Co.
National Safety Council.
Niagara Concrete Mixer Co.
Orville Simpson Co.
The Osgood Company.
Pit and Quarry.
Rinck Cordage Co.
Robins Conveying Belt Co.
ROCK PRODUCTS
Sauerman Brothers, Inc.
Smith Engineering Works
Stearns Conveyor Co.
Symons Brothers Co.
Taylor-Wharton Iron & Steel Co.
Thew Shovel Co.
Traylor Engineering & Manufacturing Co.
Traylor Vibrating Co.
Troco Lubricating Co.
The W. S. Tyler Co.
Union Explosives Company
United States Bureau of Mines
United States Bureau of Public Roads
Vulcan Iron Works
Williams Patent Crusher and Pulverizer Co.

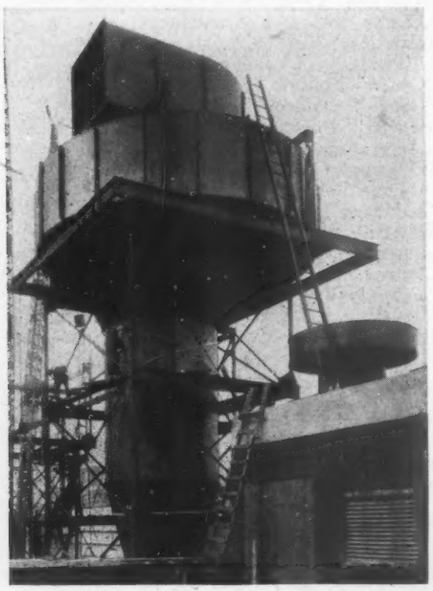
To Supply Road Material for South America

A NEW American concern which will operate in South America was made known when the Pan-American Industrial Corp. was incorporated under the laws of Delaware to supply highway building material to the principal countries of the southern continent. Its first business will be to supply stone to Argentina, which has appropriated $150,000,000 for highways.

New Machinery and Equipment

Centrifugal Type Dust Collector

A NEW type of dust collector for collection of fine dusts such as cinders and fly-ash suspended in the waste gases and coal dust arising in the preparation of pulverized coal for power plants, cement mills and other plants, is announced by the American Blower Co., Detroit, Mich. The makers believe that it can be successfully adapted to arresting the fine dusts produced in grinding rock products.



New centrifugal type dust collector

The collector operates on the principle of centrifugal separation and the type "D" Sirocco machine as developed is described by the manufacturers as follows:

"The type "D" collector consists of a main casing of volute shape provided with an inlet through which the dust laden air or gas enters tangentially. Beneath the volute a series of alternating truncated cones and cylinders are arranged, terminating in a dust outlet at the bottom; the clean air or gas emerges from a central opening in the top of the main casing or through this opening into a scroll shaped outlet head.

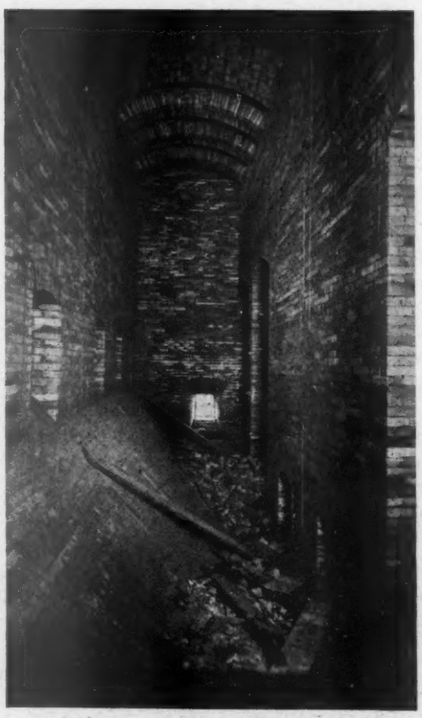
"This design creates a cyclonic action without internal turbulence. The dust laden air or gas entering the collector tangentially is forced by its velocity to take a path following the peripheral shape of the volute. The dust particles being heavier than the air or gas, are forced outwards, against the periphery, and as the action of separation is centrifugal, the separating effect increases as the radius of the volute decreases.

"In addition to moving centrifugally outwards, the dust is forced downward, partly by gravity and partly by the conical formation at the bottom of the casing, and leaves the volute in a downward direction, following a spiral path which is directed and increased in velocity by the alternating truncated cones and cylinders to the dust outlet at the bottom. The cleaned air or gas forms a vortex in the center of the collector and passes upwards through the outlet.

"The base of the vortex is formed immediately above the dust outlet, where a decided suction is present. Therefore the receptacle or means of disposing of the collected dust must be sealed while the collector is in operation. Immediately beyond and below the vortex the concentrated dust, still following its spiral path, is forced out and downward and any inward leakage would interrupt the dust flow and divert it into the vortex."

Unusual Method of Setting Arch Tile

THE illustrations accompanying show a novel construction of bonding tile, installed at the Colorado Portland Cement Co., Fort Collins, Colo. One photograph shows a view of the damper arches in the kiln housing between the kilns and the flue



Gas flues connecting kilns and waste heat boilers

below. By setting the tile on edge a rabbet was formed for the support of the horizontal damper slides, and also a "hog back" preventing the lodgment of particles of cement on the arch between the dampers. This construction was formed with George P. Reint-

Arch tile construction of damper slide support arch

jes standard block without any changes either in the dimensions of block or in the Edge Moor Iron Co. design.

The other illustration shows the gas flues built by the tile and used to connect the kilns with the Edge Moor waste heat boilers.

New Welding Rod

A NEW line of high-grade "dipped" welding rod is now obtainable from the Lincoln Electric Co. of Cleveland, Ohio. This "dipped" steel rod is the result of several years' study in the company's research laboratories and will be known as "Stable-Arc" welding rod.

With this new rod it is said to be possible to go to considerably larger diameters than has been customary in welding rods for metal electrode welding, and is being carried in all sizes up to ½ inch. It is claimed that this rod permits of much higher currents than have been used heretofore, with the resulting greater speed. Current densities of 15,000 amperes and more per square inch can be used, it is said.

"Stable-Arc" welding rod is obtainable in standard 50-lb. bundles wrapped in burlap and in lengths of 14 in. It can also be secured in longer lengths if desired.

New Digging Elevators

THE Link-Belt Co., Chicago, is now producing a special design of elevators for carrying the material from the plant sump to the top of the washing plant. The elevator is placed in this sump in such a position as to dig out the sand and gravel with little water, the surplus water flowing out at the discharge spout of the sump.

These elevators are designed, the makers say, as a substitute for the usual lifting pumps at washing plants particularly where the material does not contain many large rocks.

The head sprockets of the elevator are of cast steel, with renewable, reversible manganese steel teeth. The foot wheels are seven-sided, single-flanged, cast-steel wheels. These wheels are operated under water and are designed so the chain will not jump from the wheel in case a large stone gets between the chain and the wheel. High side flanges take care of the slack in the return run of chains. The buckets are of the continuous type equipped with manganese lips.

The chain is made of manganese steel throughout. The inside links have a boss on one side which extends to the center line of the chain. A manganese steel collar is placed around the boss. The pin is of manganese steel, with an "L" head. This head fits in the outside link, which keeps the pin from turning.

The elevator travels up the incline on single flange idlers fastened to the supporting framework. The return run hangs free from the head shaft. In existing plants using belt conveyors, the elevator buckets may be perforated, allowing the water in the buckets to drain back into the sump and permitting the discharge of fairly dry material onto the belt conveyor. In such cases an elevator of shorter centers may be used. Proper drainage can be obtained with about 35-ft. centers.

Plants now operating with dry pits, but having sufficient material below water, may, by the addition of a dredge pump and digging elevator, excavate that part of the pit below water and put the material through the present washing and screening plant.

New One-Yard Power Shovel

A NEW ONE-YARD power shovel, convertible to clamshell, dragline or pull shovel, is announced by the Ohio Power Shovel Co., Lima, Ohio. The machine power unit is either gasoline, electric motor or Diesel engine, at the purchaser's option.

Several new features have been incorporated into the new shovel, the manufacturers state, chief of which are the use of Timken roller bearings and a single line hoist. The latter application is said to be the first of its kind on a power shovel of this size, although it has been used with success on larger machines.

Another feature claimed is the three-lever control, the position and throw being arranged to obtain good yardage in a short time, according to the manufacturers. The dipper crowd is controlled independently and the propelling drive is through gears under the truck in an oil-tight case. Power consumption has been reduced considerably through the use of roller bearings at essential parts, the manufacturers state.

New power shovel with three-lever control

New digging elevator in position at the plant

Foot of the digging elevator in the plant sump

Tentative Convention Program of N. C. S. A. Announced

THE FOLLOWING tentative program for the 1928 convention of the National Crushed Stone Association, to be held at West Baden, Ind., on January 16, 17, 18 and 19, has been arranged:

MONDAY, JANUARY 16—10 A. M.
Morning Session
Otho M. Graves, Presiding

10:00 Address of Welcome—Hon. Albert J. Wedeking, Member Indiana State Highway Commission and Legislature.
10:15 Response for the Association—L. R. Cartwright, Vice-President, Midwest Crushed Stone Co., Indianapolis, Ind.
10:25 Presidential Address—Otho M. Graves.
11:00 Appointment of Convention Committees:
Rules and Procedure.
Resolutions.
Nominating.
Auditing.
Reception.
Publicity.
11:15 Reports of Directors on Business Conditions in 1927 and the Outlook for 1928.
12:45 to 2 P. M. Greeting Luncheon. Everyone, including active and associate members, as well as guests, is cordially invited to attend.
Luncheon Address—"Industrial Sovereignty and Common Welfare," William J. Matthews, attorney at law, Chicago and New York, counsel for various trade organizations.
Afternoon Session
2:30 "Bituminous Tops for Old Roads"—A. H. Hinkle, superintendent of maintenance, State Highway Commission, Indianapolis, Ind.
2:50 Discussion of preceding address. Opened by George E. Martin, consulting engineer, the Barrett Co., New York City.
3:00 "How a Research Laboratory Will Benefit the Crushed Stone Industry"—A. T. Goldbeck, director, bureau of engineering, National Crushed Stone Association.
3:30 Discussion of Bureau of Engineering. Opened by F. C. McKee, chairman of committee on research, Pittsburgh, Penn.
4:00 General Business.
4:15 Adjournment.
Monday Evening—7:30 P. M.
7:30 Opening of Manufacturers Division, Exposition of Quarry Equipment and Machinery.
9:30 Smoker and Entertainment. Compliment of Indiana producers.

TUESDAY, JANUARY 17—10 A. M.
Morning Session

10:00 Report of Committee on Standards—Col. O. P. Chamberlain, chairman.
Subcommittee on Standardization of Drilling Equipment—Fred A. Gill, chairman.
Subcommittee on Standardization of Quarry Tracks and Cars—W. E. Farrell, chairman.
Subcommittee for the Standardization of Commercial Sizes of Crushed Stone—W. R. Sanborn, chairman.
10:25 Report of Committee on Membership—J. R. Boyd, chairman.
10:30 "Broken Stone Cost Keeping Suggestions"—Dr. George E. Ladd, Bureau of Public Roads, Washington, D. C.
11:00 Discussion of preceding address. Opened by J. R. Thoenen, mining engineer, Nonmetallic Minerals Station, Bureau of Mines, New Brunswick, N. J.
11:15 "Recent Steps in Business Self-Government"—Gilbert H. Montague, counsellor at law, New York City.
11:45 Discussion of preceding address.
11:55 "Efficient Transportation"—H. G. Taylor, manager, Public Relations Sections, Car Service Division, American Railway Association, Washington, D. C.
12:25 Discussion of preceding address. Opened by John Rice, chairman, mineral aggregates committee, Atlantic States Shippers Advisory Board, Easton, Penn.
12:35 General Convention Business.
12:45 Adjournment.
Luncheons and Afternoon Group Meetings.
Operating Men, Superintendents and Manufacturers
A. G. Seitz, Rock-Cut Stone Co., Presiding
1:00 Luncheon.
1:45 "Truck Operation in Quarries"—F. S. Jones, production engineer, the General Crushed Stone Co., Easton, Penn.
2:00 General discussion of preceding address.
2:15 "Analysis of Relative Values of Various Screens"—D. W. Yambert, the France Stone Co., Toledo, Ohio.
2:30 Discussion of preceding address.
2:45 "Question Box" on quarry questions.
3:00 Motion picture by Hercules Powder Co. covering quarry operations.
3:15 Tour of exposition under direction of manufacturers.
4:15 Automobile trip to French Lick and other points.

Sales Group
H. B. Allen, the General Crushed Stone Co., Presiding
1:00 Luncheon.
2:00 "The Ethics of Competition."
2:10 Discussion of preceding address.
2:20 "The Value of Advertising to an Association."
2:30 Discussion of preceding address.
2:40 "The Value of Advertising to the Individual Producer"—W. Scott Eames, general manager, the New Haven Trap Rock Co., New Haven, Conn.
2:50 "The Storage of Stone at Service Plants as a Means of Increasing Sales"—A. L. Worthen, vice-president, Connecticut Quarries Co., Inc., New Haven, Conn.
3:00 Discussion of preceding address.
3:10 "The Use of Association Publications in Increasing Sales"—J. R. Boyd, secretary, National Crushed Stone Association, Washington, D. C.
3:20 Discussion of preceding address.
3:30 "The Bureau of Engineering and Sales"—A. T. Goldbeck, director, Bureau of Engineering, National Crushed Stone Association, Washington, D. C.
3:40 Discussion of preceding address.
3:50 General Business.
4:00 Adjournment.
Luncheon
Speakers, guests and all those desiring to attend.
1:00 Luncheon.
General discussion—no formal program.
2:15 Adjourn to attend either the meeting for operating men, superintendents and manufacturers or that of the sales group as may be individually desired.

TUESDAY EVENING
8:15 Vaudeville show imported from Chicago.

WEDNESDAY, JANUARY 18—10 A. M.
Morning Session

10:00 "Development of Tennessee's Highway System"—C. N. Bass, commissioner of highways and public works, Nashville, Tenn.
10:30 Discussion of preceding address. Opened by H. E. Rodes, Franklin Limestone Co., Nashville, Tenn.
10:40 "How a Mineral Aggregate Association Can Co-operate to Assure the Furnishing of Specified Material"—H. S. Mattimore, engineer of tests and materials investigation, Department of Highways, Harrisburg, Penn.
11:10 Discussion of preceding address.
11:20 "The Value of Research"—Charles M. Upham, director, Highway Research Board, consulting highway engineer and business director, American Road Builders Association, Washington, D. C.
11:50 Discussion of preceding address. Opened by C. N. Conner, chairman, committee on low cost improved roads, Highway Research Board, Washington, D. C.
12:00 Address—J. V. Neubert, chief engineer maintenance of way, the New York Central Railroad Co., New York City.
12:20 Discussion of preceding address.
12:30 Report of committee on welfare and safety—N. S. Greensfelder, chairman.
12:35 General Business.
12:45 Adjournment.
Luncheons and afternoon group meetings.
Annual Meeting National Agstone Association.
L. E. Poorman, President, Presiding.
This meeting is open to everyone interested in the production and marketing of agricultural limestone, whether or not a member of this association.
1:00 Luncheon.
1:45 Address by Leo E. Poorman, president.
2:00 Address, E. J. Leenhouts, general agricultural agent, New York Central Railroad Co., giving his views of the agstone industry from a railroad standpoint.
2:20 Discussion.
2:30 Address, Dr. Firman Bear, director of soils department, Ohio State University, Columbus, Ohio.
3:00 Address, J. C. King, sales manager, Carbon Limestone Co., Youngstown, Ohio.
3:30 Committee Reports.
3:35 Election of Directors.
3:45 Directors Meeting for Election of Officers.
4:00 Adjournment.
Accident Prevention Conference.
D. C. Souder, Chairman, Quarry Section, National Safety Council, Presiding.
1:00 Luncheon.
1:45 Address, R. P. Blake, sales engineer, Independence Bureau, Philadelphia, Penn.
2:05 Discussion of preceding address.
2:15 Address, W. H. Weitknecht, general superintendent, Lehigh Portland Cement Co., Mitchell, Ind.
2:35 Discussion of preceding address.
2:45 Address, W. W. Adams, supervising statistician of accident section, Bureau of Mines, Washington, D. C.
3:05 Discussion of preceding address.
3:15 General business.
3:30 Motion picture prepared by Institute of Makers of Explosives.
4:00 Inspection first-aid car of Bureau of Mines.
7:00 P. M. Banquet—Col. O. P. Chamberlain, toastmaster.
Speakers: Hon. Harold Van Orman, lieutenant governor of Indiana.
Hon. A. J. Brosseau, president, Mack Trucks, Inc., and chairman of the highways committee, National Automobile Chamber of Commerce, Inc., New York City.
Hon. Norman Hapgood, journalist and ex-minister to Denmark, New York City.

THURSDAY, JANUARY 19—10 A. M.
Morning Session

10:00 Address, R. T. Giles, chief engineer of concrete control, Blaw-Knox Co., Pittsburgh, Penn.
10:25 Discussion of preceding address.
10:30 "Effective Support of Campaigns for Public Improvements"—C. D. Franks, Portland Cement Association, Chicago, Ill.
10:55 Discussion of preceding address.
11:00 "Purchasing and Its Relation to Industrial Progress"—M. E. Towner, general purchasing agent, Western Maryland Railway Co., Baltimore, Md.
11:25 Discussion of preceding address.
11:30 "Crushed Stone Industry—Its Value to Transportation"—H. O. Hartzell, executive assistant to vice-president, Traffic and Commercial Developments, Baltimore and Ohio railroad, Baltimore, Md.
11:55 Discussion of preceding address.
12:00 Reports of convention committees in order stated.
Rules and Procedure.
Auditing.
Resolutions.
Nominating.
12:30 Installation of president.
12:45 Adjournment.
Afternoon
1:00 Farewell luncheon for everyone.
2:00 Meeting of Board of Directors and Officers.
2:00 Meeting of Manufacturers Division.

FOR THE LADIES
January 16, 17, 18 and 19

Arrangements have been made to provide special entertainment features for the ladies attending the convention as follows:

Monday Afternoon
Tea, auction bridge and 500 at the West Baden Springs hotel.

Monday Evening
Reception. Entertainment features the same as those provided for the men's smoker.

Tuesday Afternoon
Automobile trip, visiting French Lick Country Club, Wyandotte Cave, French Lick hotel and winter quarters of John Robinson's circus.

Tuesday Evening
Convention theater party—West Baden Springs hotel.

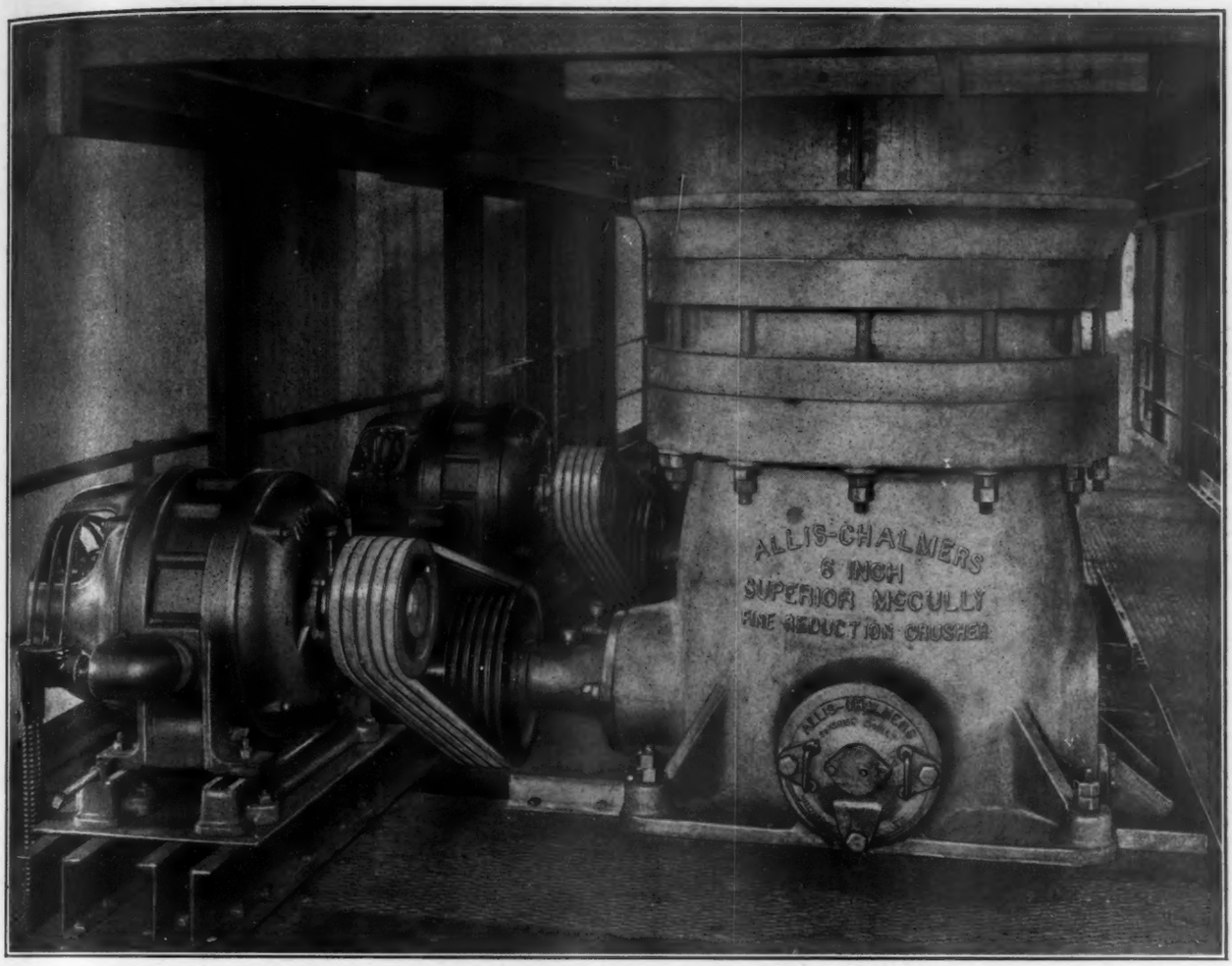
Wednesday Afternoon
Guests of Hoosier Club.

Wednesday Evening
Convention banquet.

Carrara Marble Industry Forms Export Syndicate

AN important new move affecting the Carrara marble industry in Italy is announced, viz., the formation of an export consortium. This industry is not as profitable as it should be, chiefly, it is said, because of its bad organization. The owners of the quarries number about 100 and disputes are continually arising between them on questions affecting the rights over the quarries and so on, according to the Milan correspondent of the *London Times*. Further, instead of coming to agreements as to export prices they compete one against the other, thus damaging the whole industry.

Fluctuations in price are so wide and so rapid that a foreign purchaser who buys a stock of Carrara marble cannot be sure that a competitor of his own particular supplier will not be selling the same quantity and quality of Carrara marble on the same market at a considerably lower price.



Allis-Chalmers 6-in. Superior McCully Fine Reduction Gyratory Crushers driven by Allis-Chalmers 50 HP. Type ARY Slip Ring Timken Roller Bearing Motors through Texrope Drives

Capacity Strength Dependability

The Texrope Drive enables the motor to be placed close to the crusher and its flexibility protects the motor from shocks. The Allis-Chalmers roller bearing motors are dust proof and require only infrequent greasing. This combination insures continuity of service at lower maintenance cost.

MODERN business conditions demand high capacity, strength and continuity of operation together with simplicity. The Superior McCully Fine Reduction Gyratory Crusher has proved itself the world over for these requirements. It is readily accessible, has a short rigid hollow bored forged steel main shaft, large cast steel eccentric, cut steel gears, positive geared force feed oiling system and reversible top shell with vertical concaves. These features together with the inherent advantages of the Superior McCully Gyratory Crusher design result in the lower operating costs.

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.

News of All the Industry

Incorporations

West End Quarry, Ltd., Montreal, Can., $99,000.

National Lime Co., Ltd., St. Marc des Carrieres, Que., $19,000.

Manitoba Limestone Co., Ltd., Winnipeg, Man., $500,000.

Ready-Mixed Sales Corp., New York, N. Y., $20,000.

Zenith Limestone Co., Tulsa, Okla., $5,000 and 2,500-35,000 shares, no par value.

Spokane Mica Co., Spokane, Wash., $700.000. W. T. C. Lewis, Minnie Lewis and Mark Collins.

Jacksonville Interlocking Tile Co., Jacksonville, Fla. O. L. Vordermark, E. S. Moore and others.

Muldoon Fullers Earth Corp., Houston, Tex., $25,000. L. D. Brown, First National Bank Bldg., Houston; Mary A. Brown and E. C. Alley.

Kenvil Sand and Gravel Co., Kenvil, N. J., $125,000. Wm. M. Seguine and J. A. Jardine, Kenvil, and H. T. Curnow, Mine Hill, N. J.

Epling Sand and Gravel Co., Gallipolis, Ohio, $50.000. M. S. Epling, J. G. Epling and M. T. Epling.

Victory Sand and Stone Co., Topeka, Kan., $100,000. Paul Sherman, Topeka; John Loveridge, Des Moines, Iowa, and others.

George Rogers Clark Sand and Gravel Co., Vincennes, Ind., $10,000. Glen Rainbolt, Helen Rainbolt and John A. Riddle.

Statesville Tile and Terrazzo Co., Statesville, N. C., $50,000. S. Taro, Charles Taro and F. S. Sherrill.

St. Marys Cement Co., St. Marys, Ont., 20,000 shares at $100 each and 140,000 shares no par value. To manufacture artificial stone and cement.

Motor Truck Service and Supply Co., Redbank, N. J., $500,000. To manufacture artificial stone and produce sand and gravel and to carry on trucking business.

Penn Jersey Cut Cast Stone Co., Woodbury, N. J., $125,000. Walter Jones and Lawrence J. Darm, Woodbury, and Richard Teuber, Vineland, N. J.

Kingsway Brick and Tile Co., Clyde, Ohio, $15,000. To manufacture cement and clay products. C. A. Sinning, E. D. Young, B. S. Graves, John Leibengood, A. L. Eberhard and A. M. Le Fever.

Stucco Products, Ltd., Toronto, Can., 200 preferred shares at $50 each, and 3000 common shares, no par value. To manufacture and deal in stucco cement and artificial stone, and to erect kilns and storage bins.

Brownsville Maine Slate Co., Presque Isle, Me., $100,000. To open old slate quarries at Brownsville, Me. President, Lawrence D. Alline of Presque Isle; treasurer and clerk, Medley T. Billings of Milo, and Frank E. Davis of Portland.

Yavapai Onyx Chip Corp., Dyersville, Iowa, has been chartered to utilize the onyx chips produced by the Yavapai Onyx Co. of Dyersville, in the construction of terrazzo and mosaic floors. There is a large quantity of scrap and waste onyx at the plant in Dyersville and this material will be crushed first, and a larger and more permanent plant will later be constructed at the quarries in Arizona. The directors of the company include W. B. Millard, John Daugherty, James F. Kelley, Fred Daugherty and Samuel Friedman.

Quarries

Big Rock Stone and Material Co., Little Rock, Ark., has purchased a site for a large warehouse near the center of the city, from the city of Little Rock. The purchase price was $40,000.

Gouverneur Limestone Co., Gouverneur, N. Y., has resumed operations at its quarry following the pumping out of the water which flooded it during November.

Canada Crushed Stone Corp., Hamilton, Ont., has purchased the Puslinch quarry, situated on the main line of the Canadian Pacific Railway 45 miles west of Toronto. The new owners have started rebuilding the screen and crushing house.

Georgia Marble Co., Tate, Ga., is planning to commence operations at its quarry in Cherokee county early in 1928. This is actually the reopening of the Verde Antique quarry, which was operated years ago.

Maisonneuve Quarry Co., Ltd., Montreal, Can., is rebuilding its plant, which was totally destroyed by fire last spring, on a site opposite that occupied by the former plant. It is expected that the new plant will be in operation by April of this year.

Somerset Stone Crushing Co., Bernardsville, N. J., sold its quarry to the Hoffman Construction Co. and its organization has been dissolved. The quarry, which was the only property of the Somerset Co., had not been operated for some time.

Founder's Sand and Supply Co., Detroit, Mich., has purchased 52 acres of land near Sturgeon Bay, Wis., and is planning to open a stone quarry on the property in the spring. It is expected that 110 more acres will be acquired later. The property now owned provides a quarter of a mile of lake frontage for development of docking facilities.

Sand and Gravel

Tennessee Valley Sand and Gravel Co., Sheffield, Ala., is constructing a new sand and gravel dredge on the Muscle Shoals canal. The dredge will be 40x128 ft., with a 10-in. cutter head. It will cost approximately $45,000.

Putnam Sand Co., Salina, Kan., is installing new machinery at its pit to bring the production from 200 to 500 yd. of sand per day. The quality of the product will be made to conform to the new standards required by the state.

Maine Sand and Gravel Co., Portland, Me., has received a contract to supply 75,000 tons of washed gravel to the Boston & Maine R. R. to be used for ballast. The material, which is to be furnished from the pit at Milton, N. H., is scheduled for spring delivery.

Keystone Sand and Supply Co., Pittsburgh, Penn. The keel has been laid at the Neville Island shipyards for the first of a fleet of eight sand and gravel barges of the flush deck type for the Keystone company. The Dravo Constructing Co., Pittsburgh, is building the barges.

Wyoming Public Service Commission, Cheyenne, Wyo., recently announced that the Chicago & Northwestern, Burlington and Union Pacific railroads have voluntarily reduced the rates on carload shipments of sand and gravel, the reduction being made to co-operate with the better highway movement in Wyoming.

Cement

Colorado Portland Cement Co., Denver, Colo., has announced a new product, hydro-plastic waterproof portland cement.

Signal Mountain Portland Cement Co., Chattanooga, Tenn. The quarterly meeting of the board of directors was held on December 12, 1927. Hardwick Caldwell was elected a member of the board to succeed the late J. L. Caldwell. The annual meeting of the stockholders of the company will be held in January.

Great Lakes Portland Cement Co., Buffalo, N. Y., sustained an explosion at its plant recently which resulted in the death of Lacey Smith, a workman, and the injury of other workers. It was reported that the explosion was caused by unburned coal dust left in a kiln. The safety committee of the plant is investigating the accident to place the responsibility.

American Portland Cement Co., Foreman, Ark., has made a contract with the Southwestern Gas and Electric Co. of Shreveport, La., to furnish approximately 1,440,000 kilowatt hours monthly to the new plant at Foreman, upon its completion, about a year from now. Much of the power line from Shreveport to Foreman will have to be changed to meet this demand.

Edgar Allen & Co., Sheffield, Eng., have booked important contracts for machinery for the manufacture of cement by the rotary kiln process. One is for complete equipment for a cement factory at Berrima, New South Wales, to produce 120,000 tons of cement a year. A further contract has been placed by Oxford & Shipton Cement, Ltd., for a 120,000-ton plant to be installed at cement works in Oxfordshire. The plant will include two rotary kilns 200 ft. long and crushing, grinding and packing machinery.

Cement Products

Groveland Concrete Works, Groveland, Fla., has opened up a branch office and plant at East Howey, Fla. A. Bauer, Sr., is the owner of the company.

Castone Fireplace Manufacturing Co., Detroit, Mich., has changed its name to the Artcraft-Castone Fireplace Corp.

United Concrete Pipe and Construction Co., Wilmington, Calif., has begun the construction of a shop and shed to cost approximately $10,000.

Western Concrete Pipe Co., Southgate, Calif., is planning the construction of rock bunkers to cost $25,000.

Nichols Concrete Block Co., Dayton, Ohio, is contemplating installing new machinery and constructing new buildings at its Wolf Creek plant during the present year.

Prendergast Co., of Marion, Ohio, has been appointed as general distributing agent for all concrete products made for use on railroads throughout the country by the Greenville Gravel Corp.

Semloh Construction Co., Brooklyn, N. Y., plans the construction of a cement products plant at 69th St. and Avenue Y, to cost approximately $40,000.

Deshler Brick Co., Deshler, Nebr., has commenced the production of concrete pressed brick. Milton Buhler and F. A. D. Lueders of Deshler and G. E. Rudolph of Parish, Ill., are the owners of the company.

Parsons Foundry and Machine Co., Parsons, Kan., has acquired the Marshall Metal Co. and the consolidated company holds the manufacturing rights in eleven states of a new cement brick machine which is being leased to concerns in the eleven states. The Parsons company is also manufacturing the brick at its own plant. W. C. Jourdan is the inventor of the process.

Lime

Eastern Lime Co., Windsor, Nova Scotia, has started work on the erection of a new hydrating plant. It will be constructed of galvanized iron with a wood frame.

Rockland and Rockport Lime Corp., Rockland, Me., has made Knott C. Rankin general superintendent to take the place of W. C. Bird, whose resignation was noted in the December 24 issue of Rock Products. D. C. Kelsey was made assistant to Mr. Rankin.

Talc

United States Talc and Crayon Co., Glendon, N. C., will rebuild the portion of its mill which was recently destroyed by fire at a loss of about $50,000. The company is contemplating the purchase of considerable equipment, including air compressors, electric motors and dynamo, a cableway screening equipment and deep-mine elevators.

Gypsum

Canada Gypsum and Alabastine, Ltd., Paris, Ont., Canada, will open an office in Vancouver, B. C.

Structural Gypsum Corp., New York City, is planning a new one-story plant at Linden, N. J., to cost more than $200,000, including equipment.

Shumacher Wallboard Co., Los Angeles, has awarded the contract for a one-story addition to its plant to the Austin Co. of California. The addition will be 45x550 ft. and will cost about $80,000, including equipment.

United States Gypsum Co., Chicago, Ill., has appointed J. W. Butler of Chicago as general manager of the Oakfield plant of the company near Batavia, N. Y.

Smith-Douglas Co., Norfolk, Va., has completed additions to the fertilizer factory and finished the construction of a factory to manufacture land plaster from gypsum rock. The initial cargo of gypsum rock has been received from Nova Scotia to start the work in the new factory. The cost of the improvement is approximately $90,000.

Miscellaneous Rock Products

Rubber-Rock Corp., Price, Utah, is installing crushing machinery at its new plant for the crushing of bituminous sandstone. The product of the plant will be used for road surfacing material.

Green River Improvement Association, Green River, Ky., is urging the construction of larger locks in the Green and Barren rivers to provide for the increased tonnage on the two rivers in the past two years. This is the largest rock asphalt region in the United States and a large portion is that product.

Southern Asbestos Co., Charlotte, N. C., which was recently formed in the state of Delaware, will take over and expand the local company of the same name. The new organization has arranged for a bond issue of $1,250,000 and a stock issue of $410,000. A portion of this will be used to acquire more property and make improvements. The company now operates a branch mill at Lincolnshire, N. C.

Personals

Edward Bolanz, Huntington, Ind., has been made Indiana agent for the Kelley Island Lime and Transport Co., Cleveland, Ohio.

E. P. Newhard, chief chemist for the southern division of the Pennsylvania-Dixie Cement Corp., has moved his headquarters from Kingsport to Chattanooga.

John A. Kling, president of the Cleveland Builders Supply and Brick Co., and chairman of the board of the Kelley Island Lime and Transport Co., has accepted the post of commissioner for promotion of economy and good will in the sewer pipe industry.

Eugene G. Grace, president of Bethlehem Steel Corp., has announced a series of gold awards for progress during 1928 in eliminating preventable accidents. The awards will be made quarterly. The plan will cover all of the corporation's subsidiaries and will include more than 68,000 employes in steel plants, mines, quarries, shipyards and other operating units.

W. L. Rutherford, vice-president in charge of sales of the B. F. Goodrich Rubber Co., recently resigned from that position. He had been with the Goodrich company since 1901 and had been vice-president for the past ten years. Mr. Rutherford said he had made no definite plans for the future. He was formerly president of the Rubber Association of America.

Obituaries

Joseph S. Mitchell, head of the Diamond Drill Department of the Sullivan Machinery Co., Chicago, Ill., died on December 22.

Manufacturers

Hendrick Manufacturing Co., Carbondale, Penn., announces the opening of a Chicago district office at 223 Railway Exchange Bldg., in charge of Lon Sloan.

Lincoln Electric Co., Cleveland, Ohio, announces the transfer of Mr. John Van Horne from Atlanta to Moline, Illinois, where he will be located at 514½ Fifteenth St.

Young Radiator Co., Racine, Wis., will exhibit various types of radiators for roadbuilding machinery at the National Good Roads Show at Cleveland, January 9-13.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., at a recent meeting of its Board of Directors, elected the following officers: Clinton M. Finney, comptroller; Warren H. Jones, secretary, and Edward J. Mulligan, assistant secretary.

General Electric Co., Schenectady, N. Y., announces the creation of a motor division of its industrial department, with J. E. N. Hume as manager, and F. M. Kimball as advisory manager. K. N. Runkle has been appointed manager of mining and steel mill sales succeeding Mr. Hume.

Link-Belt Co., Chicago, Ill., has appointed four vice-presidents: George P. Torrence, Indianapolis, in charge of Indianapolis operations and sales of Indianapolis plant products; George L. Morehead, Philadelphia, in charge of Eastern operations and sales; Frank B. Caldwell, in charge of the Chicago plant and the office in conjunction with that plant; W. C. Carter, in general charge of production at all plants, with headquarters at the company's general offices at Chicago.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Explosives. Bulletin containing new edition of chart on brands of explosives and uses to which they are adapted. E. I. DU PONT DE NEMOURS & CO., INC., Wilmington, Del.

Conveying Equipment... Bulletin No. 517 on pneumatic conveyors for handling raw materials. THE DUST RECOVERING AND CONVEYING CO., Cleveland, Ohio.

Mixer. Illustrated bulletin on open-drum, paddle type of mixer for concrete products plants, made in 9, 14, 21 and 42 cu. ft. capacities. Ideal Division of CONSOLIDATED CONCRETE MACHINERY CORP., Adrian, Mich.

Speed Reducers. Illustrated booklet giving dimensions and descriptive data on worm gear and spur gear reducers of various types. Issued as Bulletin "A." ALBAUGH DOVER MANUFACTURING CO., Chicago.

Crushing Plant Equipment. Bulletin No. 1466 on crushers, elevators, screens, hoists, etc., giving dimensions, weights and capacities. ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.

Flexible Couplings and Speed Reducers. Bulletin No. 150, giving dimensions and data on flexible couplings, and 48-page booklet, issued as Bulletin No. 160, containing illustrations and complete data on speed reducers and gears. THE FALK CORP., Milwaukee, Wis.

Bag Company to Build Southern Plant

THE Bates Valve Bag Corp., Chicago, Ill., announces the building of a factory at Birmingham, Ala., for the manufacture of its "multi-wall" paper bag container for pulverized rock products. The factory will contain space for the warehousing of other Bates products, which include the packer, wire ties for closing cotton or jute bags, and supplies of space parts of all Bates equipment.

The initial unit of the new plant will be a one-story building of fireproof construction, 60 ft. wide and 150 ft. long. The plant is intended primarily to serve the southern users of Bates bags and equipment.

Columbia River Gravel Companies Must Pay Royalty

AUDIT of the books of the several sand and gravel companies operating in the state of Oregon to determine the amount of sand they have taken from the Columbia and Willamette rivers was recently completed and the report of Sawtell, Withington and Jacob, Portland certified public accountants, has been made public. The audit was ordered after it was reported to the land boards that the sand and gravel companies had taken large amounts of sand from the Columbia river, for which they had paid neither the states of Oregon nor Washington any royalty.

A total of 2,427,563 cu. yd. of sand have been taken from the Columbia river by 13 operators since January, 1920. Of this amount 579,234 yd. went into public works, according to claims of the operators, leaving approximately 1,800,000 subject to the sand and gravel royalty laws of the states of Oregon and Washington and on none of which any royalty has been paid.

Interest of the two state departments in sand operations along the Columbia river was aroused several months ago when it was called to their attention that neither state was reaping any royalties from sand taken from the river. Several conferences between the sand companies and the two state boards were held in Salem in an attempt to arrive at a settlement of the royalty claim of the two states.

An offer of a flat payment of $1000 by the operators in lieu of royalty payments to date was rejected by the state boards and the audit decided upon.

The state of Oregon is collecting royalty at the rate of 10 cents per yard on gravel taken from other streams in the state. Columbia river operators have indicated that any attempt to levy such tribute against them, especially for their past operations, would be regarded as prohibitive and that they will fight any such attempt in the courts.

The states of Oregon and Washington have agreed to an equal division of any royalty that is collected on sand removed from the Columbia river during the past seven years, but virtually all future revenues from this source will accrue to the state of Washington, since practically all the sand is taken from the Washington side of the river.

Officials said that any future royalties would be paid to the states of Oregon and Washington based on the amount of sand taken, and the location of the operations. If the sand is taken from the Washington side of the channel the royalty will be demanded by that state. The state of Oregon will demand royalty on any sand taken from the Oregon side of the stream.

An audit covering operations on the Willamette river for the same period shows a total of 2,529,000 yd. of sand and gravel removed from this stream. Royalties have already been paid to the state on a basis of 2,124,000 yd., leaving approximately only 400,000 yd. unpaid for. This difference, according to members of the state land board, is represented largely by operations of the past few months on which settlements have not yet been made, and does not, in fact, represent discrepancy in the accounts of the operators. It is believed that no action will be necessary on Willamette river gravel.

THE GOOD ROADS MACHINERY CO., Inc.

KENNETT SQUARE, PA.

Factories—Kennett Square, Pa., and Marathon, N. Y.

Branch Offices:

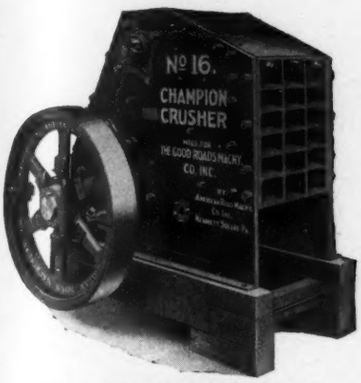
New York City.....50 Church St.
Chicago .....49th & Halsted Sts.
Philadelphia .....Commercial Trust Bldg.
Pittsburgh ..... Oliver Bldg.

Boston ...36 Pleasant St., Watertown, Mass.
Portland, Oregon....3rd & Hawthorne Sts.
Los Angeles .....931 Santa Fe Ave.
San Francisco.....29 Freemont St.

TRADE MARK

PRODUCTS—Crushers both stationary and portable; Belt Conveyors; Steel Bucket Elevators; Screens; Scrubbers; Sand Wash Boxes; Feeders; Dewatering Machines; Quarry Cars; Hoists; Bin Gates; Road Oilers; Road Graders; Sand Spreaders; Road Rollers; Snow Plows.

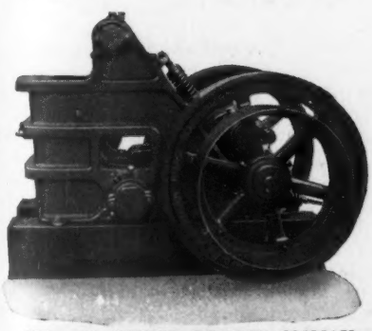
ROCK CRUSHERS



NO. 16 CHAMPION CRUSHERS

Opening 16" x 36"

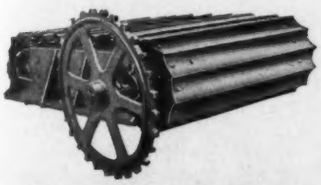
"Good Roads" Champion Rock Crushers are made in sizes from 7½" x 13" opening to 22" x 50". Capacities from 12 to 100 tons per hour. The cam shape of main shaft gives same number of movements to crushing jaw at one-half the speed of eccentric type jaw crushers. Low speed means low maintenance. Main frame members are high carbon rolled steel suitable for withstanding tremendous shocks.



NO. 2½ "GOOD ROADS" CLIMAX CRUSHER

Opening 10" x 20"

"Good Roads" Climax Rock Crushers are made in sizes from 9" x 16" opening to 12" x 26". Capacities 15 to 30 tons per hour. Crusher frame is of cast steel.

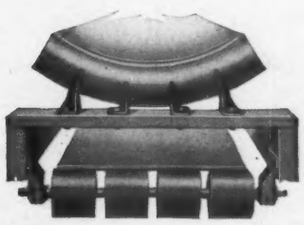


"GOOD ROADS" FEEDERS

"Good Roads" Steel Apron Feeder. Good Roads feeders are of the steel apron type as shown above, or of the reciprocating type. The Apron Feeder is recommended for use with receiving hoppers for sand and gravel work.

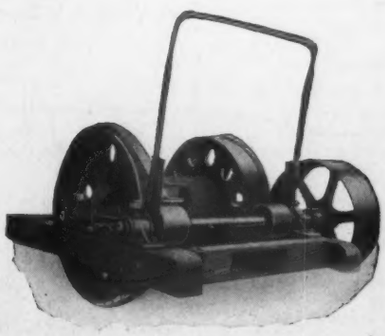
BUCKET ELEVATORS

"Good Roads" Champion Elevators are of the continuous type with steel buckets on chain or belt as conditions warrant. Made in capacities from 20 tons per hour to 200 tons; in lengths from 16' 0" to 100' 0". Elevators are for stone, sand, gravel, slag, coal, etc.



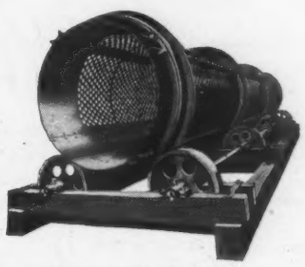
BELT CONVEYORS

"Good Roads" Concave Belt Conveyors are made in three- and five-pulley types, plain or roller bearing troughing idlers and when required fitted for and with trippers.



WINDING DRUM

"Good Roads" Champion Winding Drum is operated by friction pulley from eccentric shaft bearings. Speed 200 ft. per min. The drum is belt-driven.



REVOLVING SCREENS

"Good Roads" Champion Screens are made in four models and many sizes. There is a type and size for every condition, dry or wet process.

"Good Roads" Roller Driven Screen. Driven by friction from steel tired wheels. No gears to cut out from dust. Screen Sections four pieces in circumference. Smaller screens are of gear driven type.

"GOOD ROADS" HEAVY DUTY COMBINATION SCRUBBER AND SCREEN

The screen is arranged with a scrubber for washing and saturating the material before coming to screens. Dirty material not passing specifications may be cleaned and brought up to specifications by use of this combination scrubber and screen.

"GOOD ROADS" SAND WASH BOX

"Good Roads" Sand Wash Boxes are made in three different sizes. They are used in connection with scrubber screens or where dewatering is required. In connection with screens the material together with loam and dirty water pass into washer. The flights move slowly through the box, dragging the sand over sand thus producing scouring action. The clean material is elevated to the higher level while loam and dirty water pass out the flume or gate at lower level. Especially suitable for sand and gravel work.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 120

Aerial Wire Rope Tramways
American Steel & Wire Co.
A. Leschen & Sons Rope Co.

Agitators, Thickeners and Slurry Mixers
Hardinge Co.
Morris Machine Works
Polysius Corp.
F. L. Smidth & Co.

Air Compressors
Chicago Pneumatic Tool Co.
Pennsylvania Pump & Compressor Co.
Traylor Eng. & Mfg. Co.

Air Separators
Hardinge Co.
New Haven Sand Blast Co.
Raymond Bros. Impact Pulv. Co.
W. W. Sly Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Automatic Weighers
Merrick Scale Co.

Backfillers
Bucyrus-Erie Co.

Bags
Valve Bag Co. of America

Bagging Machinery
Valve Bag Co. of America

Ball Bearings
New Departure Mfg. Co.

Balls (Tube Mill, etc.)
Advance Foundry Co.
Allis-Chalmers Mfg. Co.
Coates Steel Products Co.
Polysius Corp.
W. A. Riddell Co.
F. L. Smidth & Co.

Batchers
Blaw-Knox Co.

Bearings
New Departure Mfg. Co.
Timken Roller Bearing Co.
T. B. Wood's Sons Co.

Bearings (Anti-Friction)
New Departure Mfg. Co.
Timken Roller Bearing Co.

Bearings (Collar Oiling)
New Departure Mfg. Co.
Timken Roller Bearing Co.
T. B. Wood's Sons Co.

Bearings (Radial)
New Departure Mfg. Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
New Departure Mfg. Co.
Timken Roller Bearing Co.

Belt Fasteners and Hooks, Lacings and Rivets
Crescent Belt Fastener Co.

Belting
Cincinnati Rubber Mfg. Co.

Bins (Cement, etc.)
Blaw-Knox Co.
Burrell Eng. & Const. Co.
Galland-Henning Mfg. Co.
Good Roads Mchy. Co., Inc.
McGann Mfg. Co., Inc.
Traylor Eng. & Mfg. Co.

Bin Gates
Austin Mfg. Co.
R. H. Beaumont Co.
Easton Car & Construction Co.
Galland-Henning Mfg. Co.
Good Roads Machy. Co., Inc.
Industrial Brownhoist Corp.
Link-Belt Co.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.

Blast Hole Drills
Loomis Machine Co.

Blasting Machines
Hercules Powder Co.

Blasting Powder
Hercules Powder Co.

Block Machines (Concrete)
W. A. Riddell Co.

Blocks (Pillow & Roller Bearing)
Timken Roller Bearing Co.
T. B. Wood's Sons Co.

Blocks (Sheave)
R. H. Beaumont Co.
Sauerman Bros.

Bodies (Motor Truck)
Easton Car & Construction Co.

Brick Hardening Cylinders
Komnick Machy. Co.

Brick Loading Apparatus
Komnick Machy. Co.

Brick Machinery (Sand Lime and Slag)
Dr. Bernhardi Sohn
Deister Concentrator Co.
Jackson & Church Co.
Komnick Machy. Co.
W. A. Riddell Co.

Bucket Conveyors (See Conveyors and Elevators)

Buckets (Dragline)
R. H. Beaumont Co.
Sauerman Bros.

Buckets (Elevator and Conveyor)
Cross Engineering Co.
Galland-Henning Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Polysius Corp.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.

Buckets (Grab, Clamshell, etc.)
Blaw-Knox Co.
George Haiss Mfg. Co., Inc.
Industrial Brownhoist Corp.
Link-Belt Co.
Orton Crane & Shovel Co.
Owen Bucket Co.

Buhr Mills
J. B. Ehrsam & Sons Mfg. Co.

Buildings
Blaw-Knox Co.
H. K. Ferguson Co.

Cableways
R. H. Beaumont Co.
S. Flory Mfg. Co.
Link-Belt Co.
Mundy Sales Corp.
Sauerman Bros.

Calcining Kettles (Gypsum)
J. B. Ehrsam & Sons Mfg. Co.

Car Pullers
Mundy Sales Corp.
Stephens-Adamson Mfg. Co.

Cars (Dump)
Austin Mfg. Co.
Easton Car & Construction Co.
Link-Belt Co.

Cars (Quarry and Gravel Pit)
Easton Car & Construction Co.

Carriers
Barber-Greene Co.
Stephens-Adamson Mfg. Co.

Castings
Advance Foundry Co.
Eagle Iron Works
Link-Belt Co.
McGann Mfg. Co., Inc.
Vulcan Iron Works

Cement Pumps (See Pumps, Air Pumps)

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
S. G. Taylor Chain Co.

Chain (Elevating and Conveying)
Stephens-Adamson Mfg. Co.

Chain Drives
W. A. Jones Fdy. & Machine Co.
Link-Belt Co.

Chain Links (Cold Sheet, Repair, etc.)
Bucyrus-Erie Co.
S. G. Taylor Chain Co.

Chemists
Arnold & Weigel.
Rob't W. Hunt Co.

Chutes and Chute Liners
Advance Foundry Co.
Cross Engineering Co.

Clamshell Buckets—See Buckets (Grab, Clamshell, etc.)

Clamshell Cranes (See Cranes)

Classifiers
Traylor Vibrator Co.

Clay Working Machinery
Bonnot Co.

Clutches
W. A. Jones Fdy. & Machine Co.
T. B. Wood's Sons Co.

Clutches (Friction)
T. B. Wood's Sons Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Bonnot Co.
Hardinge Co.
Pennsylvania Crusher Co.
Polysius Corp.
Raymond Bros. Impact Pulv. Co.
Vulcan Iron Works.
Williams Patent Crusher & Pulverizer Co.

Compressed Air Hoists
Chicago Pneumatic Tool Co.

Compressed Air Rock Drills
Chicago Pneumatic Tool Co.

Compressors
Pennsylvania Pump & Compressor Co.

Concentrators (Magnetic)
Dings Magnetic Separator Co.

Concentrators (Slurry, etc.)
Deister Concentrator Co.
Traylor Vibrator Co.

Concrete Forms (Steel)
Blaw-Knox Co.

Concrete Mixers
Niagara Concrete Mixer Co.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 120

Contactors (Belt)
T. B. Wood's Sons Co.

Contractors and Builders
Burrell Eng. & Const. Co.
H. K. Ferguson Co.

Conveyor Belting (See Belting)

Conveyors and Elevators
Austin Mfg. Co.
Barber-Greene Co.
R. H. Beaumont Co.
Galland-Henning Mfg. Co.
Good Roads Machy. Co., Inc.
George Haiss Mfg. Co., Inc.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Link-Belt Co.
Polysius Corp.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulverizer Co.
T. B. Wood's Sons Co.

Coolers (See Kilns and Coolers, Rotary)

Core Drilling (See Drills—Diamond Core)

Couplings (Flexible and Shaft)
Fawcus Machine Co.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
T. B. Wood's Sons Co.

Couplings (Friction)
T. B. Wood's Sons Co.

Couplings (Hose, Pipe, Etc.)
Chicago Pneumatic Tool Co.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Insley Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Thew Shovel Co. (Electric, Gasoline & Steam)

Crusher Protectors
Dings Magnetic Separator Co.

Crushers (Hammer)
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin Mfg. Co.
Earl C. Bacon Co. (Jaw)
Galland-Henning Mfg. Co.
Good Roads Machy. Co., Inc.
Polysius Corp.
Smith Engineering Works.
Traylor Eng. & Mfg. Co.

Crushers (Rotary)
J. B. Ehrsam & Sons Mfg. Co.
Polysius Corp.

Crushers (Single Roll)
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan-Stone Machine Co.

Crushing Rolls
Advance Foundry Co.
Allis-Chalmers Mfg. Co.
Galland-Henning Mfg. Co.
Jeffrey Mfg. Co.
Polysius Corp.
Traylor Eng. & Mfg. Co.

Derricks and Derrick Fittings
S. Flory Mfg. Co.
Mundy Sales Corp.

Dewatering Machines
Chicago Pneumatic Tool Co.

Diamond Core Drilling (See Drilling—Diamond Core)

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
Marion Steam Shovel Co.
Orton Crane & Shovel Co.
Thew Shovel Co. (Steam Shovel)

Ditchers
Barber-Greene Co.
Insley Mfg. Co.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Insley Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Monighan Machine Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Thew Shovel Co.

Dragline Excavators
Marion Steam Shovel Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Thew Shovel Co. (Electric, Gasoline & Steam)

Dragline Cableway Excavators
R. H. Beaumont Co.
Bucyrus-Erie Co.
Good Roads Machy. Co., Inc.
Link-Belt Co.
Marion Steam Shovel Co.
Mundy Sales Corp.
Sauerman Bros.

Dredge Chain (See Chain)

Dredge Pipe (See Pipe)

Dredges
Bucyrus-Erie Co.
S. Flory Mfg. Co.
Marion Steam Shovel Co.
Morris Machine Works
Mundy Sales Corp.

Drill Steel
Chicago Pneumatic Tool Co.

Drilling Accessories
Loomis Machine Co.

Drills (Blast Hole)
Loomis Machine Co.

Drills Hammer (See Hammer Drills)

Drills (Rock)
Chicago Pneumatic Tool Co.

Drives (See Gears, Chain Drives, etc.)

Drives (Short Center)
T. B. Wood's Sons Co.

Dryers
Allis-Chalmers Mfg. Co.
Bonnot Co.
Galland-Henning Mfg. Co.
McGann Mfg. Co., Inc.
Polysius Corp.
Raymond Bros. Impact Pulv. Co.
W. A. Riddell Co.
Ruggles-Coles Div. of Hardinge Co., Inc.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works

Dust Arresters
New Haven Sand Blast Co.
Pangborn Corp.
W. W. Sly Mfg. Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
New Haven Sand Blast Co.
Pangborn Corp.
Polysius Corp.
W. W. Sly Mfg. Co.

Electric Drills (Portable)
Chicago Pneumatic Tool Co.

Electric Hauling Systems
Geo. D. Whitcomb Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Engineers
Arnold & Weigel.
Bonnot Co.
J. C. Buckbee Co.
Burrell Eng. & Const. Co.
H. K. Ferguson Co.
Robt. W. Hunt Co.
Kritzer Co.
H. Miscampbell.
Williams Patent Crusher & Pulverizer Co.

Engines (Diesel)
Chicago Pneumatic Tool Co.

Engines (Gasoline, Kerosene and Oil)
Buda Company
Mundy Sales Corp.

Engines (Steam)
Morris Machine Works
Mundy Sales Corp.

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Fans
Jeffrey Mfg. Co.
Vulcan Iron Works

Fans (Exhaust)
New Haven Sand Blast Co.
W. W. Sly Mfg. Co.

Feeders
Traylor Vibrator Co.

Forgings (Steel)
Coates Steel Products Co.

Frogs and Switches
Easton Car & Construction Co.
L. B. Foster Co.
Morrison & Risman Co.

Furnaces
Raymond Bros. Impact Pulv. Co.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Gasoline Engines—See Engines (Gasoline, Kerosene and Oil)

Gasoline Tanks (See Tanks—Gasoline)

Gears (Machine Molded)
Vulcan Iron Works

Gears (Spur, Helical, Worm)
Farrel-Birmingham Co., Inc.
Fawcus Machine Co.
D. O. James Mfg. Co.
Jeffrey Mfg. Co.
W. A. Jones Fdy. & Machine Co.
R. D. Nuttall Co.
Palmer-Bee Co.

Gears and Pinions
Farrel-Birmingham Co., Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Stephens-Adamson Mfg. Co.
Vulcan Iron Works.

Gear Reducers
Farrel-Birmingham Co., Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Palmer-Bee Co.

Generators (See Motors and Generators)

Grab Bucket Cranes (See Cranes)

Grab Bucket (Hoists & Monorail) (See Cranes)

Grab Buckets—See Buckets (Grab, Clamshell, etc.)

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

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Graphite (Lubricating)
Acheson Graphite Co.

Graphite Powders
Acheson Graphite Co.

Grating (Steel)
Blaw-Knox Co.

Grease
Acheson Graphite Co.

Grinding Balls
Advance Foundry Co.
Coates Steel Products Co.
Jeffrey Mfg. Co.

Grizzlies
Austin Mfg. Co.
Eagle Iron Works
Galland-Henning Mfg. Co.
Good Roads Machy. Co., Inc.
Polysius Corp.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Traylor Vibrator Co.

Grizzly Feeders
Polysius Corp.
Traylor Vibrator Co.

Gypsum Plaster Plants
J. B. Ehrsam & Sons Mfg. Co.

Gyrating Screens (See Screens)

Hammer Drills
Chicago Pneumatic Tool Co.

Hammer Mills (See Crushers)

Hangers (Shaft)
T. B. Wood's Sons Co.

Hoists
Chicago Pneumatic Tool Co.
S. Flory Mfg. Co.
Hyman-Michaels Co.
Link-Belt Co.
Mundy Sales Corp.
Northwest Engineering Co.
Sauerman Bros.
Vulcan Iron Works.

Hooks
S. G. Taylor Chain Co.

Hose Couplings (See Couplings, Hose, Pipe)

Hose (Water, Steam, Pneumatic and Air Drill)
Cincinnati Rubber Mfg. Co.
Chicago Pneumatic Tool Co.

Hydrators (Lime)
Arnold & Weigel.
Jackson & Church Co.
Kritzer Co.
McGann Mfg. Co., Inc.
H. Miscampbell.
Vulcan Iron Works

Injectors
Penberthy Injector Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Bonnot Co.
Hardinge Co.
McGann Mfg. Co., Inc.
Polysius Corp.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works.

Kilns (Shaft)
Arnold & Weigel.
McGann Mfg. Co., Inc.
H. Miscampbell.
Vulcan Iron Works.

Kominuters (See Mills)

Laboratories (Magnetic)
Dings Magnetic Separator Co.

Lime Handling Equipment
Arnold & Weigel.
Kritzer Co.
Link-Belt Co.
McGann Mfg. Co., Inc.
H. Miscampbell.
Raymond Bros. Impact Pulv. Co.

Lime and Hydrating Plants
Arnold & Weigel.
Vulcan Iron Works

Line Shaft Couplings
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
T. B. Wood's Sons Co.

Linings (See Mill Liners & Linings)

Loaders and Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Good Roads Machy. Co., Inc.
George Haiss Mfg. Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.

Locomotive Cranes (See Cranes)

Locomotives (Steam, Gas and Electric)
Fate-Root-Heath Co. (Gas).
Hyman-Michaels Co.
Lima Locomotive Works (Steam).
Jeffrey Mfg. Co.
Plymouth Locomotive Works (Gas).
Vulcan Iron Works
Geo. D. Whitcomb Co.

Locomotives (Storage Battery)
Jeffrey Mfg. Co.
Geo. D. Whitcomb Co.

Lubricants
Acheson Graphite Co.

Lubricating Systems
Penberthy Injector Co.

Machinery Guards
Harrington & King Perforating Co.

Magnetic Pulleys
Dings Magnetic Separator Co.

Magnets
Dings Magnetic Separator Co.

Metal (Alloys, See Alloys, Babbitt Metal, Manganese Steel, Steel, etc.)

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
Bonnot Co.
Hardinge Co.
Jackson & Church Co.
Polysius Corp.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Advance Foundry Co.
Jeffrey Mfg. Co.
F. L. Smidth & Co.

Mining Engineers (See Engineers)

Motors and Generators (Electric)
Allis-Chalmers Mfg. Co.

Nuggets (Tubemill, Grinding)
Coates Steel Products Co.

Oil Burners
Chicago Pneumatic Tool Co.

Oil Burning Apparatus
Raymond Bros. Impact Pulv. Co.

Oilers
Traylor Vibrator Co.

Ore Jigs
McLanahan-Stone Machine Co.

Packings (Pump, Valve, Etc.)
Cincinnati Rubber Mfg. Co.

Perforated Metal
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
W. Toepfer & Sons Co.

Pile Drivers
Bucyrus-Erie Co.

Pipe
L. B. Foster Co.

Plates (Steel)
Blaw-Knox Co.

Plug Valves (See Valves)

Pneumatic Drills (See Drills)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
Austin Mfg. Co.
Barber-Greene Co.
George Haiss Mfg. Co., Inc.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Portable Loaders
Jeffrey Mfg. Co.

Pulleys
T. B. Wood's Sons Co.

Protectors (Crushers)
Dings Magnetic Separator Co.

Pulleys (Friction Clutch)
W. A. Jones Fdy. & Machine Co.
T. B. Wood's Sons Co.

Pulleys (Magnetic) (See Magnetic Pulleys)

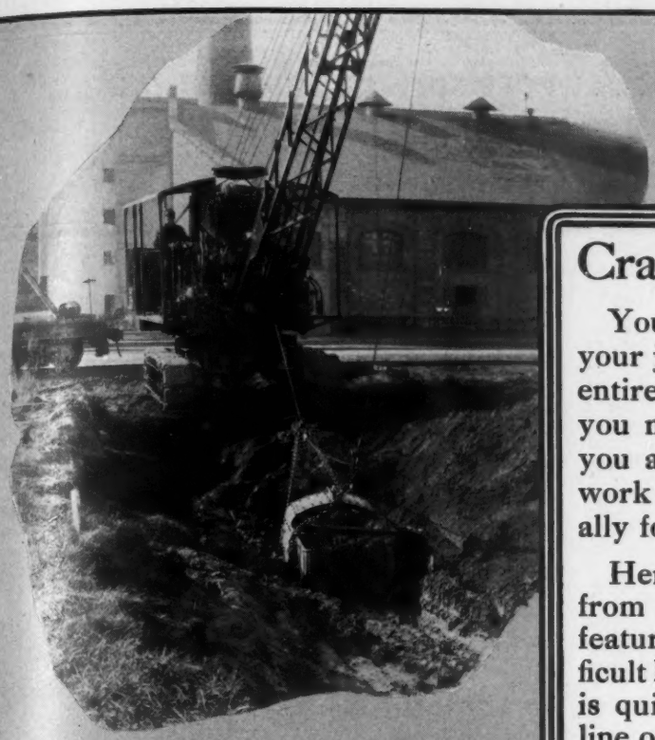
Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
Bonnot Co.
Hardinge Co.
Jeffrey Mfg. Co.
Polysius Corp.
Raymond Bros. Impact Pulv. Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulverizer Co.

Pumps (Air Lift)
Chicago Pneumatic Tool Co.
Fuller Co.
Pennsylvania Pump & Compressor Co.

Pumps (Cement Slurry)
Fuller Co.
Morris Machine Works
Polysius Corp.
F. L. Smidth & Co.
A. R. Wilfley & Sons.

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Morris Machine Works
Pennsylvania Pump & Compressor Co.
A. R. Wilfley & Sons.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Morris Machine Works
Traylor Vibrator Co.
A. R. Wilfley & Sons.

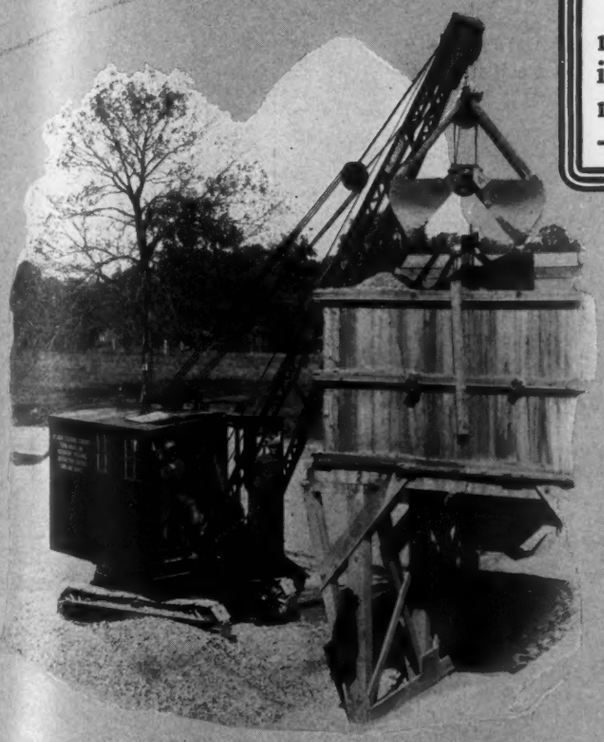


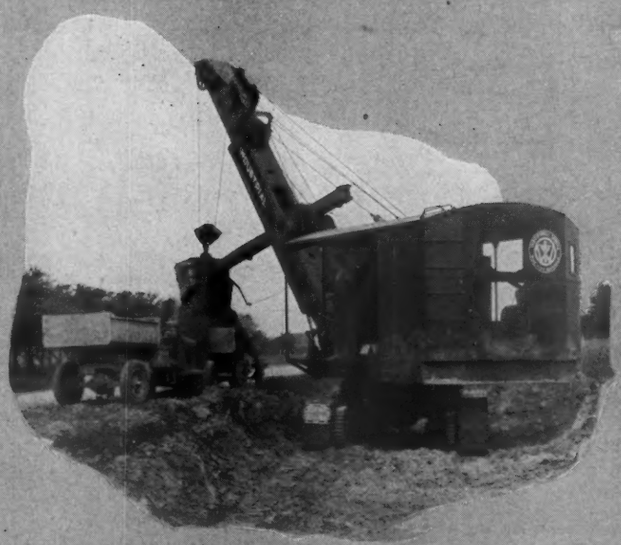
Crawlers for Every Need

You want one kind of crawler for your job—the next fellow may need an entirely different type—but whatever you need, our complete line will give you a machine that couldn't do your work better if it were designed especially for you.

Here is a line-up of shovels, in sizes from ½ to 1¼ yards, with mechanical features that will speed up the most difficult handling or excavating job. Each is quickly convertible to crane, dragline or trench hoe.

Our job for fifty years has been to manufacture handling equipment that is profitable to the user. We've saved money for over ten thousand owners—can't we do the same for you?





Industrial Brownhoist Corporation
General Offices: Cleveland, Ohio.
District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, St. Louis, San Francisco, New Orleans, Bay City, Mich.

INDUSTRIAL BROWNHOIST

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

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Rails
Easton Car & Construction Co
L. B. Foster Co.
Hyman-Michaels Co.
Morrison & Risman Co.

Road Machinery
Austin Mfg. Co.
Barber-Greene Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Chicago Pneumatic Tool Co.
Good Roads Machy. Co., Inc.
Marion Steam Shovel Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.

Rock Drills (See Drills, Rock)

Rod Mills
Jackson & Church Co.
Traylor Eng. & Mfg. Co.

Roller Bearings
Timken Roller Bearing Co.

Roofing and Siding
New Jersey Zinc Co.

Roofing Machinery (Cement Asbestos)
Komnick Machy. Co.

Rope (Wire) (See Wire Rope)

Sand Separators
Stephens-Adamson Mfg. Co.

Sand Settling Tanks
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Scrapers (Power Drag)
Austin Mfg. Co.
R. H. Beaumont Co.
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros.

Screens
Allis-Chalmers Mfg. Co.
Austin Mfg. Co.
Earl C. Bacon Co.
Cross Engineering Co.
Deister Concentrator Co.
Eagle Iron Works.
Good Roads Machy Co., Inc.
Hardinge Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan-Stone Mach. Co.
Niagara Concrete Mixer Co.
Orville Simpson Co.
Polysius Corp.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Traylor Vibrator Co.
W. S. Tyler Co.
Williams Patent Crusher & Pulverizer Co.

Seal Rings (Rotary Kiln)
Advance Foundry Co.

Separators, Air (See Air Separators)

Separators (Magnetic)
Dings Magnetic Separator Co.

Separators (Slurry)
F. L. Smidth & Co.

Shafting
T. B. Wood's Sons Co.

Sharpening Machines, Drill (See Drill Sharpening Machines)

Shovels (Steam, Gas, Electric, Diesel, Oil)
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Insley Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Monighan Machine Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Thew Shovel Co.

Signals (Mine and Quarry)
Traylor Vibrator Co.

Silos
Burrell Eng. & Const. Co.

Skips
Link-Belt Co.
Vulcan Iron Works

Skip Hoists and Skips
R. H. Beaumont Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Slings (Wire Rope)
A. Leschen & Sons Rope Co.

Slugs (See Grinding Balls and Nuggets)

Speed Reducers
Farrel-Birmingham Co., Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
R. D. Nuttall Co.
Palmer-Bee Co.
Stephens-Adamson Mfg. Co.

Spouts, Chutes (See Chutes and Chute Liners)

Sprockets and Chain
Jeffrey Mfg. Co.
W. A. Jones Fdy. & Machine Co.
S. G. Taylor Chain Co.

Steam Specialties
Penberthy Injector Co.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel Fabrication
H. K. Ferguson Co.

Steel Plate Construction
Hendrick Mfg. Co.
McGann Mfg. Co., Inc.

Stokers
Raymond Bros. Impact Pulv. Co.

Stone Grapples—See Grapples (Stone)

Storage Equipment
R. H. Beaumont Co.
Sauerman Bros.

Strenes Metal
Advance Foundry Co.

Tampers
Chicago Pneumatic Tool Co.

Tanks
Blaw-Knox Co.
Galland-Henning Mfg. Co.
McGann Mfg. Co., Inc.

Testing Sieves and Shakers
W. S. Tyler Co.

Thickeners
Hardinge Co.
Traylor Vibrator Co.

Tools, Drill (See Drilling Accessories)

Track Equipment
Easton Car & Construction Co.
L. B. Foster Co.

Track Shifters
Nordberg Mfg. Co.

Trailer Cranes (See Cranes)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Farrel-Birmingham Co., Inc.
D. O. James Mfg. Co.
W. A. Jones Fdy. & Machine Co.
Kritzer Co.
Stephens-Adamson Mfg. Co.
Timken Roller Bearing Co.
T. B. Wood's Sons Co.

Trenchers (Wheel and Ladder Type)
Barber-Greene Co.

Troughs
Cross Engineering Co.

Truck Cranes (See Cranes)

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tunnelling Machines
Bucyrus-Erie Co.

Turntables
Easton Car & Const. Co.

Underground Loaders
Bucyrus-Erie Co.
Thew Shovel Co.

Vibrating Screens (See Screens)

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Deister Concentrator Co.
Eagle Iron Works
Galland-Henning Mfg. Co.
McLanahan-Stone Mach. Co.
F. L. Smidth & Co.
Smith Engineering Works.
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Hazard Wire Rope Co.
A. Leschen & Sons Rope Co.

Worm Gears (See Gears)

Zinc
New Jersey Zinc Co.

WE LIVE AND LEARN!

Plan to attend the

Eleventh Annual Convention
NATIONAL CRUSHED STONE ASSOCIATION
and
Manufacturers' Division Exposition of Quarry Equipment and Machinery

West Baden, Indiana, January 16, 17, 18, 19, 1928

West Baden Springs Hotel

DURING the past ten years, the National Crushed Stone Association has convened ten times for the purpose of discussing subjects that are of vital importance to everyone in the industry. And every year, those who were fortunate enough to have been in attendance have gone away infinitely better fitted to carry on because of this opportunity for the interchange of ideas with practical operating men from all parts of the country.

Can we count on you being present at the Eleventh Annual Convention? (Note the place and date above.) Undoubtedly, this will be the largest and most valuable convention ever held by the Association. Year by year the interest in these gatherings has been steadily increasing. Stone men all over the country have realized the vast benefits to be gotten from trading ideas with men from other sections; of the value of keeping thoroughly posted on the trend of affairs within the industry. A further feature of the Convention will be in a comprehensive showing of the latest developments in quarry machinery and equipment by the Manufacturers' Division—which will afford an unusual opportunity for quarry men to acquaint themselves with the latest in operating equipment.

This Convention is the high spot of the year! By all means plan to be there. Whether you are a member of the Association or not makes no difference. **Remember the date.**

NATIONAL CRUSHED STONE ASSOCIATION

651 Earle Building, Washington, D. C.

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MACHINERY FOR SALE

ROTARY CRUSHERS
Three No. 0, Three No. 1, One No. 1½, One No. 2 Sturtevant Rotary Fine Crushers, Three No. 0, One No. 1 Sturtevant Ring Roll Mill, One No. 2 Duplex Sturtevant Ring Roll Mill.

GYRATORY CRUSHERS
All sizes from No. 2 Reduction up to 12K.

JAW CRUSHERS
One 2"x6", Two 7"x10", Two 9"x15", One 6"x20", One 10"x15", One 10"x20", Two 12"x24", One 13"x30", One 15"x36", One 18"x36", One 24"x36", One 22"x50", One 36"x48", One 40"x42", One 60"x84".

CRUSHING ROLLS
One 8"x6", Two 16"x10", Three 30"x10", Two 36"x16", Two 42"x16", One 54"x24", Two 14"x20", and One 24"x12" Crushing Rolls.

DRYERS
One 3'x20', Three 4'x30', One 5'x40', Two 5½'x 40', One 6'x60', One 7'x60', and Two 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30' Ruggles Coles type "A" and One 4'x 20' Ruggles Coles type "B" Double Shell Rotary Dryers, Three 6'x25' Louisville Dryers.

KILNS
One 4'x40', Two 6'x60', Two 6'x90', One 6'x 100', One 6'x120', One 7½'x80', Three 8'x 125'.

HARDINGE MILLS
Two 3', Three 4½', Three 6' and Two 8' Hardinge Mills.

SWING HAMMER AND TUBE MILLS
Fuller, Griffin and Raymond Mills, Screens, Air Separators, etc.

SPECIAL
One No. 6 Williams Universal Pulverizer.

THE HEINEKEN ENGINEERING CORP.
95 Liberty St. New York City
Telephone Hanover 2450

Machinery For Sale

Immediate Shipment—Attractive Prices

1—5'6"x50' Renneberg Direct Heat Rotary Dryer.
2—7'x7' Gates Ball Mills.
1—4'x16' Smidth Tube Mill, brick lined.
1—No. 6D Gates Gyratory Crusher.
1—5'x22" Hardinge Conical Mill.
1—24"x36", Style D, Jeffrey Hammer Mill.
3—Sets 20x14" Sturtevant Granulating Rolls.
1—Set 36x16" Sturtevant Balanced Rolls.

If you don't see what you require—inquire

UNITED UTILITIES, Inc.
17 W. 60th Street New York City

Located at Benson Mines, N. Y.

200 tons 60 lb. Good Relaying RAILS.
No. 8-D GATES CRUSHER. Good as new.
24x36" P. & M. JAW CRUSHER. New.
2—33-ton Standard Gauge LOCOMOTIVES.
1—5'x6' EDISON CRUSHER ROLLS.
36x36" EDISON CRUSHER ROLLS.
18x24" LINK BELT SPIKE ROLLS.
2—8'x6' BALL MILLS. Good as new.
2—300 H.P. B. & W. BOILERS.
36—7½-yd. STEEL SKIP.
8—24x30" MAGNETIC SEPARATORS.
G. E. MOTOR, 3 ph., 60 cycle, 400 v., from 10 to 200 H.P.

EQUIPMENT SALES CO.
Richmond, Virginia, and Benson Mines, N. Y.

Rebuilt Dump Cars

20-yard, all steel, Western air dumps. Ten of these.
12-yard, steel underframe, hand dumps. Seven of these.
6-yard, steel underframe, hand dumps. Seven of these.

Rebuilt Locomotives

55-ton Baldwin 6-wheel switcher, separate tender, 200 lb. steam, built 1913.
43-ton Baldwin 6-wheel switcher, separate tender, 180 lb. steam, built 1917.
72-ton American 6-wheel switcher, separate tender, 180 lb. steam. Four duplicates.
42-ton American 4-wheel saddle tank, 180 lb. steam, built 1910.
31-ton Baldwin 4-wheel saddle-tank, built 1914.
21-ton Porter 4-wheel saddle tank, 170 lb. steam, built 1922, 36-in. gauge. Two duplicates.

Rebuilt Locomotive Cranes

20-ton Link-Belt 8-wheel 2-line, built 1916.
20-ton Industrial 8-wheel, 2-line, built 1917.
22½-ton Ohio 8-wheel, 2-line, built 1915.

Birmingham Rail & Locomotive Company
Birmingham, Alabama

Want to Sell Any Used Equipment?

We receive hundreds of inquiries from our 6,000 Sand, Gravel and Stone Producers, 30,000 Contractors, and 1,500 Concrete Product Plants, who buy their used equipment through our services.

Want to Buy Any Used Equipment?

We have every kind of well conditioned used equipment, located in every part of this country and Canada, and are saving our listed members thousands of dollars yearly on their purchases.

Want to Rent, Lease or Trade Any Equipment?

We have many inquiries from those who want to rent, trade and lease their equipment, and vice versa.
We will appreciate your inquiries.
Special: Two Complete Duntile Plants for sale at a bargain.

NATIONAL EQUIPMENT CO.
At Terms to Suit Purchaser
P. O. Box H. 232 Bloomington, Indiana

CRAWLER SHOVELS

2—ERIE DREADNAUGHT; STEAM, new 1926; 1-yd., HIGH LIFT, 40 ft. Crane Boom if desired.
1—KOEHRING, GASOLINE, new late 1926; 1-yd., HIGH LIFT, just overhauled; like new.

CRANES

1—12-ton cap. ORTON, GASOLINE, Caterpillar; new late 1925; 50 ft. boom, bucket operating; steel cab, overhauled; low price.
1—30-ton, 8-wheel BROWNING No. 3 Locomotive Crane, new 1921, A.S.M.E. & Mass. Boiler; 50 ft. and 70 ft. boom; bucket operating; full M. C. B.; overhauled.

DUMP CARS

30-yd., 20-yd., 16-yd., and 12-yd., std. gauge, ALL-STEEL, latest type Automatic Air Dump Cars. Practically new.

GREY STEEL PRODUCTS COMPANY
111 Broadway New York, N. Y.

FOR SALE

1—Class A-2 Ruggles-Cole Dryer.
1—Bradley Three Roll Mill.
1—18x24 in. Single Roll Crusher.
2—Packers.

Apply Box 1365, Providence, R. I.

Sell your discarded equipment! It's probably worth more than you realize. Try an advertisement in this section.

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USED EQUIPMENT

CONOWINGO CONSTRUCTION EQUIPMENT

FOR SALE

MARION MODEL 21 STEAM SHOVELS
FULL CRAWLER TRACTION

PURCHASED NEW IN 1926

Some with 40 ft. Crane Booms

READY FOR IMMEDIATE SHIPMENT

The Susquehanna Power Co.
Philadelphia Electric Power Co.

Communicate with
STONE & WEBSTER, Inc.
Agent
Havre de Grace, Md.

FOR SALE

STONE CRUSHING MACHINERY
PRICED FOR QUICK SALE

1—Set Sturtevant Balanced Rolls, 21x11 in.
1—Sturtevant Duplex Steel Jaw Crusher, 6x15 in.
1—Kite Jaw Crusher, 7x16 in.
1—Sturtevant Jaw Crusher, 8x19 in.
1—Williams No. 2 Hammer Mill.
1—Sturtevant No. 2 Rotary Crusher.
1—Champion Jaw Crusher, 9x15 in.
1—Jeffrey Type A Hammer Mill, 30x24 in.
1—Allis-Chalmers Roll Crusher, 24x14 in.
8—6x4 in. Bucket Elevators, 30 ft. centers.
1—Sturtevant 3-Tier Moto Vibro Screen, Type MV, with screw feed.
1—3x6 ft. Trommel Screen.
1—100 H.P. Locomotive Type Boiler, 100 lb. pressure.

Write, wire or phone your inquiries

CONSOLIDATED PRODUCTS CO., Inc.
15 Park Row, New York City Barclay 0603

FOR SALE

SPECIAL—Two Raymond 5-roll low-side mills complete. Perfect condition, requiring no repairs. Pulverized coal. Must be moved quickly. $3800 for both. Also 4-roll high-side at $1500.
10—Raymond 2, 3, 4 and 5-roll high and low-side mills.
8—Raymond pulverizers Nos. 1, 0, 00, 000, 0000.
3—Fuller-Lehigh Mills, 33", 42" air and screen types.
8—Hardinge Mills, 2x8", 6x22, 8x30, 8x36, 8'x48".
12—Tube mills, various sizes.
1—Large Kritzer Lime Hydrator complete.
3—Smidth Kominuters, Nos. 64, 66. Complete.
3—No. 2 Sturtevant Ring-Roll mills. Complete.
1—48" Symon Disc crusher.
6—Williams Mills, Infant, No. 2, No. 6.
2—K-B hammer mills, No. 1, No. 2.
5—Ruggles-Coles dryers, 4x30; 5x30; 80"x45; 8'8"x85.
Many different sizes of Rotary, Gyratory, Jaw and Roll Crushers; Hammer, Tube and Ball Mills; Dryers, Etc.

Robert P. Kehoe Machinery Co.
7 E. 42nd St., N. Y. City—Yards and shop, N. Y. C.

FOR SALE

2—Northwestern gasoline mine locomotives, 24" ga. $750 each.
1—Northwestern gasoline mine locomotive, 6 ton, 36" ga. $1000.
1—7½ Telsmith gyratory crusher, never used, with 75 H.P. motor and skip car. $2500.

W. W. TAYLOR Signal Mountain, Tenn.

CRUSHING ROLLS

1—54x24 in. Allis-Chalmers, nearly new, Manganese Shells. In A-1 condition.

The Standard Slag Company
Youngstown, Ohio

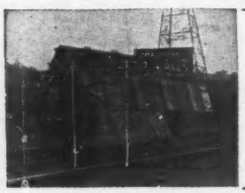
FOR SALE

Two—750 KW G. E. Turbo generator sets. Turbines three stage, Curtis Bleeder Type, 3600 R.P.M., operating on 125 pounds steam pressure, complete with a Westinghouse 1300 sq. ft. surface condenser and accessories. The generators are 937 KVA machines or 750 K. W. at 80% power factor, and operate on 440 volts, 60 cycle, 3 phase current. This equipment is complete with switchboard, exciter and panels and is located in New York City.

These machines were new in 1922 and we discontinued their operation in the summer of 1926. They were in first class operating condition when taken out of service.

If interested, please write the

United States Gypsum Company
300 West Adams St. Chicago, Ill.



In stock 250—24" gauge 2-way Western and Austin dump cars, one and one and one-half yard capacity, in good serviceable second-hand condition. Also a number of new "V" shaped dump cars, 24" gauge: rails, new and relaying and all sorts of tracks supplies of all sections.

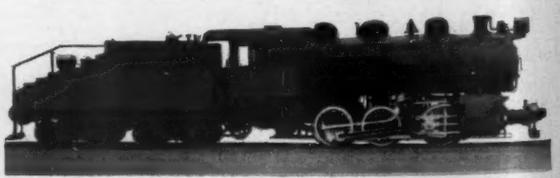
Park Row Bldg. New York City **M. K. FRANK** Union Trust Bldg. Pittsburgh, Pa.

FOR SALE

Complete gravel dredging plant with the following equipment, built in March, 1926:—Dredge Boat, 36' long x 18' wide; two pontoons, 8' x 16' supporting 10" Swintek Cutter with 10 HP motor; one 8" late type AMSCO Pump belted to 150 HP slip ring motor with drum controller and resistance; one 3 drum Thomas extra heavy duty motor driven hoist; one high pressure priming and bilge pump, motor driven. All motors 3 phase, 60 cycle, 220 or 440 volts. 600 ft. 8" discharge pipe with flexible couplings and Knox clamps. Pump and equipment in first class operating condition. Will demonstrate at any time. Price $10,000 for immediate sale.

The East End Sand and Gravel Co.
Chillicothe, Ohio

FOR SALE



75-ton, 21x26 in. American Locomotive Co. 6-Wheel Switcher, BUILT DECEMBER, 1922; piston valve; Walschaert valve gear; Alco power reverse; superheated; tractive power about 36,000 lbs.; steel wheel centers; steel running boards; steel cab; steel tender frame; electric headlights both ends; flexible staybolts. Complies all I. C. C. requirements, etc. READY IMMEDIATE SHIPMENT.
17—16-yd. WESTERN, heavy duty, steel beam type, 2-way dump cars. Some air, some hand dump. Rebuilt with entire new bodies, steel lined floors.
10—20-yd. WESTERN, all steel, two-way air dump cars; vertical air cylinders.
1—50-B Bucyrus Steam Shovel on caterpillars.

HAVE OTHER EQUIPMENT OVERHAULED AND READY
SOUTHERN IRON & EQUIPMENT CO. ***(Est. 1889)*** **ATLANTA, GA.**

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USED EQUIPMENT

"IT HAS NEVER BEEN DONE BEFORE"

For Sale—NEW KILNS and COOLERS

At Used Equipment Prices

Located at NEW BRUNSWICK, N. J.

10—8'x125' Standard VULCAN ROTARY KILNS.
10—5'x50' Standard P. & M. ROTARY COOLERS.

1—9'x100' Standard VULCAN ROTARY KILN.
1—7½'x80' Standard VULCAN ROTARY KILN.
1—7'x22' Compartment TUBE MILL—New.

EQUIPMENT SALES COMPANY **Richmond, Virginia**

RAILS New and Relay
ALL WEIGHTS AND SECTIONS
FROGS—SWITCHES—TIE PLATES
S. W. LINDHEIMER
38 S. Dearborn St. Chicago, Ill.

FOR SALE

No. 5 Telsmith gyratory crusher just released from service. Price $750 f.o.b. Barton, Wis. 16x30 Allis-Chalmers heavy duty Corliss engine. 11 ft. dia. 23" face flywheel. Modern machine in fine condition. Still on foundation and can be run for anyone interested. Price $1200 f.o.b. Barton, Wis.

NORTHERN GRAVEL COMPANY
West Bend, Wis.

Caterpillar Tractors

We offer for sale five brand-new, never used, 5-ton, 55 H.P.

Bear Caterpillar Tractors

There are none better as we have demonstrated on our own work. This is a bargain for new equipment.

ANNVILLE STONE COMPANY
Eighth and Willow Sts. Lebanon, Pa.

FOR SALE

One 3 and one 4 roll Raymond pulverizer, also crushers, dryers, pumps and hoists. Address

Box 93, care of Rock Products
542 So. Dearborn St. Chicago, Ill.

FOR SALE

One Mead-Morrison two yard Dragline Hoist, 100 HP. Lincoln motor, 3-phase, 60-cycle, 220 volts. Used in the production of only 200,000 tons of material.

SCULLY SAND AND GRAVEL CO.
118 First Street Cambridge, Mass.

FOR SALE

2—36" Sturtevant Vertical Emery Mills.
1—No. 00 Raymond Pulverizer, complete.
1—No. 0000 Raymond Pulverizer, complete.
1—33" Fuller-Lehigh Pulverizer.

Alberger Chemical Machinery Company
103 Park Avenue, New York City

UNIVERSAL CRUSHER COMPANY
Eastern Agents

All Steel Jaw Crushers. Also used equipment in crushing and power lines.

HOOPER-MOMBERGER CO.
90 West St., New York City Phone Rector 2919

USED EQUIPMENT WANTED

WANTED

Used Gyratory Reduction Crusher, 30 to 50 tons capacity. State full particulars, giving size, make, location, price.

Address QUARRY OWNER
Box 92, care of Rock Products
542 South Dearborn St. Chicago, Ill.

WANTED

One Base Casting and one Small Corrugated Head and Shaft for No. 7½ Austin Crusher. Shop No. 2759.

CONSUMERS MATERIAL CORP.
912 Midland Bldg. Kansas City, Mo.

SITUATIONS VACANT

WANTED—A FIRST-CLASS GENERAL manager for sand and gravel plants, southeastern location. Must be expericnced in operation of dredging and land plants, tugs and scows, as well as management and selling. Plants now in regular operation. The right salary to the right man. Replies confidential. Address Box 85, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

DRAFTSMAN WANTED, WITH REFERence, and cement plant experience. Address Box 83, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

SITUATIONS WANTED

CEMENT PLANT MANAGER—HAVING EXcellent record, desires to make new connection. Thoroughly experienced in all cement problems, especially cost reduction through chemical control, efficient grinding, quarrying, burning, and building up of morale. Familiar with all phases of closed and open circuit grinding, oil, coal and gas for burning and capable through past experience to supervise either preliminary surveys or construction work. Will consider plant managership or position leading to equivalent capacity after ability is proven. Can furnish record clear beyond doubt. Thirteen years experience, age 33 and married. Address Box 2244, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

PLANT MANAGER OR SUPERINTENDENT —Technical graduate, ten years' practical experience in management of mines, quarries, crushing and grinding plants both in East and far West; capable, resourceful and with excellent references as to ability and character, wishes to connect with large concern offering opportunity for permanency and advancement or with new company just entering the business. Can design, build and operate plants efficiently. Now employed. Can report in thirty days. Address Box 2267, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

WANTED—POSITION AS CHIEF CHEMIST of progressive portland cement company by technical trained man who thoroughly understands the various phases of manufacture, both chemical and mechanical. Can furnish reference of unquestionable reputation and arrange for interview. Wet process preferred. Location of no issue. Would consider an out of the States proposition. Address Box 2270, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

SUPERINTENDENT DESIRES POSITION, where efficient organization is necessary to high production. Long years experience in handling crushed stone and gravel plants under high pressure. Thoroughly familiar with all phases of industry. Excellent references. Address Box 2256, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

SUPERINTENDENT DESIRES POSITION. Have had fourteen years experience in sand and gravel business. Familiar with hydraulic or bucket excavation, with steam, electric or Diesel engine power. Can handle sales. Address Box 87, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

ENGINEER, EXPERIENCED IN DESIGN, construction and operation; cement, lime, crushing, pulverizing, conveying, ore handling and treating plants. Considerable experience in other industrial manufacturing lines. Address Box 2253, care of Rock Products, 542 South Dearborn St., Chicago, Ill.

I WANT TO CONSULT ANYONE IN NEED of a superintendent with 15 years experience operating large crushers; will be registered with Rock Products at National Stone meeting, West Baden, Ind. Address Box 86, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

MILLWRIGHT AND BLACKSMITH WITH years of experience in crushing stone and upkeep of plants, especially babbitting crushers, wants work. Prefer south or West Virginia. Address Box 94, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

CONNECTION WANTED BY A QUARRY superintendent of sixteen years' experience in the operation of large quarries. Conversant with the detail of design and economical operation of quarry, crushing plant, etc. Practical knowledge of electricity and various methods of blasting. More interested in good connection than large salary. Will guarantee maximum production at low cost with equipment available. Address Box 95, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

AVAILABLE, YOUNG MAN WITH BROAD experience as production clerk and assistant superintendent wishes to make permanent connection with company that will recognize executive ability in the handling of plant shipments, payrolls, operating costs, books and correspondence. Familiar with all phases of crushed stone industry. An adaptable and energetic hustler that can assure efficient results. Address Box 96, care of Rock Products, 542 So. Dearborn Street, Chicago, Ill.

INDEX TO ADVERTISEMENTS